JULY 25, 1923

THE RUBBER AGE

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THE RUBBER AGE

The Only Twice-a-Month Rubber Publication

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DR. GEER URGES INTERNATIONAL COOPERATION

In Address in London, Dr. W. C. Geer Urges Inter-National Cooperation on Crude Rubber and Compounding Ingredients Problems

During his visit to London Dr. W. C. Geer, vice-president of B. F. Goodrich Co., addressed a special meeting of the Institution of the Rubber Industry held at the Engineer's Club on June 25. Briefly Dr. Geer spoke of the present state of the rubber manufacturing industry and its problems.

He said that the quality of manufactured articles must be maintained, and that the responsibility of maintaining a good quality of crude rubber and a high uniformity rested upon the shoulders of the growers. Mr. Geer pleaded for World co-operation between rubber men, and suggested that the style in shoes and boots be simplified, there being at present some 500,000 different designs.

Referring to the accelerator problem Dr. Geer said that there are two points which manufacturers would do well to consider: Did the accelerator overcure, and what was its effect on aging? Out of the ten or more organic accelerators now on the market Dr. Geer said it was a question which one or two would survive. He also suggested that rubber chemists pay more attention to the problem of replacing carbon black by another substance, because the supplies of natural gas from which carbon black is obtained may sooner or later give out. Some concern was also expressed over the supply of toughening pigments.

Standard Packing for Rubber

Dr. Geer suggested that the members of the Rubber Association of America and the English manufacturers get together and adopt some kind of a standard crude rubber package. The rubber, he said, should be clean and dry, uniform in its action upon the mixing mills and calenders, and uniform in its physical properties. In concluding Dr. Geer urged the necessity for close international co-operation.

On the following evening representatives of the rubber industry gave a dinner to Dr. and Mrs. Geer, held in the Mayflower Room of the Hotel Victoria. Among those present were Sir Frank Swettenham, G.C.M.G., who occupied the chair; Oswald Latham; Fordyce Jones, who proposed "The International Rubber Industry," and who suggested that it might prove profitable to all rubber men if all could be brought together in an international union; and D. F. L. Zorn.

BEATTY BECOMES N. J. ZINC ADVERTISING MANAGER

The New Jersey Zinc Company has announced that C. F. Beatty has been appointed advertising manager of the company, effective July 2. Mr. Beatty succeeds C. A. Stedman who now enters the Eastern sales department, handling the sale of products of that company and its subsidiaries in New Jersey, Philadelphia, Baltimore and Washington. Mr. Stedman will report to F. C. Fuller, manager of Eastern sales.

Kelly Guarantees Tire Prices

The Kelly-Springfield Tire Company recently announced that it would guarantee tire prices against further cuts to dealers until October 10 next. On account of a current rumor that suggests the possibility of a tire price war, it is said that the Kelly-Springfield company took this step to restore confidence in its tire dealers and distributors.

Soil Specialists To Go With Rubber Investigators

H. H. Bennett of the Bureau of Soils has been assigned by the United States Department of Agriculture to accompany the party being sent by the Departments of Commerce and Agriculture to investigate rubber production and the possibilities for rubber growing in Central America. The party sailed for Panama on July 25.

The Bureau of Soils has a representative with another party that will investigate the rubber industry in the Amazon region of Brazil. It is probable that another expert from this bureau will be sent later with a party to investigate the possibilities of the rubber industry in the Philippines.

GOVERNMENT MEN SAIL FOR BRAZIL

Five Representatives of Dept. of Agriculture Set Sail for Brazil to Study Crude Rubber Conditions—Brazil Offers Help to American Manufacturers.

On July 1 five representatives of the United States Department of Agriculture sailed for Brazil to undertake a biological study of rubber plants and trees in the regions of the Amazon Valley. This is practically the first endeavor that our Government has made to ascertain how our American rubber manufacturers may become independent of the British rubber growers.

Already workmen in Brazil have started to return to rubber plantations, it having been reported that plantation owners doubled their forces recently. Each steamer, it is said, brings additional help for the rubber growing industry. This is the result of the British Restriction of the production of crude rubber. All told there are 9,102,808 acres in Brazil devoted to the production of rubber and nuts. If prices of Up-River Acre continue to hove around their present levels, Brazilians claim that they will be able to furnish American manufacturers with larger quantities of crude rubber.

The Brazilian government is doing everything in its power to obtain investments of American capital for the rubber growing industry in that country. They claim that they are willing to co-operate with our manufacturers to the extent of granting exemption from taxation to rubber plantations, if, later, it might gain compensatory revenues. The State of Para is supporting the Federal government in its endeavor to develop this industry, and is willing to allow American manufacturers to exploit its plantations in public lands of the state, which are very large and of the best.

Dr. Carl D. LaRue, Dr. James E. Weir, E. L. Prizer and M. K. Jessup of the Bureau of Plant Industry and Dr. C. F. Marbut of the Bureau of Soils are the men who sailed on July 1 for the Amazon. Whether American manufacturers will accept the offer of the Brazilian government will largely depend upon their report.

HENDERSON ISSUES HANDY BOOKLET OF CHARTS

F. R. Henderson & Co. has just issued a booklet of charts depicting various phases of the rubber industry in graphic form. This booklet should prove to be a valuable asset to the rubber manufacturer, or to those interested in the rubber industry, for the charts show among other things the range of prices of ribbed smoked sheets at New York for the years 1919 to 1922. Another chart shows the World's production of all rubber from 1906 to 1922. According to this graph the production of wild rubber in 1906 totaled about 30,000 tons, while in 1918 the total production fell below the 10,000 ton mark. Brazil, as is shown in the chart, produced in 1906 about 19,000 tons of rubber, against 22,000 tons in 1922.

The monthly production of pneumatic and solid tires for 1921 and 1922 is portrayed in graphic form in another chart, while the monthly production of casings, inner tubes and solids is the subject of two charts covering 1921 and 1922. The World tire export trade totaled $81,000,000 in 1922, the United States share being $20,250,000, or 25 per cent of the entire World export trade.

Other handy information—such as the production of motor vehicles in the United States for the years 1910 to 1922, monthly production of motor vehicles in 1921 and 1922, consumption of gasolene in the United States, plantation ownership, et cetera—is also given in graphic form. The booklet is bound in leather, and the loose leaf cover permits the adding of new charts which the company proposes to send out from time to time. In short this booklet contains the kind of information that reliable houses gather and disseminate among the trade.

To Open Guayule Plant In Texas

The Continental Rubber Company is preparing to reopen its plant at Marathon, Texas. The company built and placed the plant in operation about 12 years ago. At that time the border region of Texas was covered by a thick growth of the guayule shrub. After the supply had been cut the factory was closed. Since that time a new growth has appeared, and it is said that a sufficient supply is in sight to keep the plant at Marathon going for several years. This plant is the only factory in the United States for the extraction of crude rubber from guayule.

Perkins Heads Mt. Vernon Rubber

William M. Perkins has retired as executive secretary of the Marion Chamber of Commerce to become president of the Mt. Vernon Rubber Co., Mt. Vernon, Ohio. Prior to his appointment by the Marion Chamber of Commerce Mr. Perkins was affiliated with the Firestone Tire and Rubber Co. and other rubber companies at Akron. Several years ago Mr. Perkins went to Marion as receiver of the Marion Tire and Rubber Co. He carried that enterprise through its period of bankruptcy to a basis where it was sold to its present owners. After that Mr. Perkins acted in a consulting engineering capacity for several other companies.

At a luncheon given by the Chamber of Commerce he was presented by members of that organization with an engraved watch. Mr. Hunt, president of the Chamber of Commerce, in presenting the gift said that Mr. Perkins had done much in a constructive way to develop the business interests of Marion. All Marion, it is said, regrets the fact that "Will" Perkins is leaving their city.

Bemis Buys Midcontinental Tire

The Midcontinental Tire Manufacturing Company's plant, Wichita, Kansas, has been sold to the Bemis Brothers Bag Company of St. Louis, the sale price, according to receiver, Lon H. Powell, being $110,000. Mr. Carpenter, vice-president of the Bemis Bag Company, said that an engineer will be sent to Wichita at once to inspect the plant with a view of putting it in shape for the reception of bag machinery. Several months ago the tire company's plant was appraised at $160,000.

Stephens Operating Again

On June 21, A. J. Stephens and Geo. Kivovitch acquired control of the A. J. Stephens Rubber Co., Kansas City, Mo. This organization was founded by A. J. Stephens in 1916, but in January, 1922 the company went into the receiver's hands. Subsequently Mr. Stephens resigned as president. Mr. Stephens is again at the head of that company, which manufactures tire accessories, blow-out patches, reliners, sub-casings, flaps, fan belts, rim protectors, radiator hose and similar articles.

Report Seasonal Slump Over

Reports coming in from different sections of the country state that rubber companies have been experiencing their usual seasonal let-up. Most of the concerns are said to be closing down for inventory purposes. Officials of rubber companies deny that the shutdowns are due to a slump in consumption. They state that the hot spells are now producing orders. Goodyear officials state that the worst of the seasonal slump is over, and that production from now on should increase. Mechanical sales are fair with hose sales decreasing somewhat.

The National India Rubber Co., Bristol, R. I., has announced that the shoe division will be closed down for a two week period, commencing July 20. Inventory of manufactured goods in the shoe department will take place during the period. Normally the company employs about 3,500 operators, of which 3,000 are in the shoe department and 500 in the wire division.

CHEMISTS IN DEADLOCK ON YEARLY EXPOSITIONS

Chemists throughout the country, who are members of the National Exposition of Chemical Industries, are undecided as to the advisability of holding a chemical exhibition each year. A vote on this question was recently taken at the Chemists Club, New York City, and the balloting resulted in a tie vote. As only 25 per cent of exhibitors who have arranged for space at the 1923 expositions were represented, it was decided that another ballot by mail should be taken.

As to whether or not foreign products should be permitted a place in the 1923 and future chemical expositions, a vote showed that a large majority were against showing the products from Europe. Goods from Canada, however, were not excluded. Collectively most of the members favor a national exposition rather than an international one.

Receiver For United & Globe

Federal Judge Runyon appointed J. Philip Bird of New Jersey on July 10 and Henry J. Haigh of Maplewood, receivers in equity for the United & Globe Rubber Corporation of Trenton. The receivers are authorized to conduct the business for three months. Mr. Bird is president of the Trenton Manufacturers Association. As announced in the June 25 issue of THE RUBBER AGE, a creditors committee was appointed about the middle of June. This committee consisted of E. C. Stokes, A. H. Wood, H. J. Haigh, W. M. Haff and R. Badenhof.

To Re-organize Erie Tire

In order to complete the plans for re-organizing the Erie Tire & Rubber Co., Sandusky, O., additional capital, totaling about $650,000, will be required. This plan is being fostered by Jule Surtman, chairman of the stockholders protective committee, and it is stated that the $650,000 will be needed to take care of outstanding liabilities and the cost of receivership. It is purposed that $350,000 be raised in first mortgage bonds and $300,000 in assessments on the stockholders.

It is said that the audit of the receivers filed on April 30 showed assets greater than $883,471, the amount of outstanding liabilities. The assets of the company include $278,743 in stock subscriptions and the balance of $604,727 is represented as an interest belonging to the stockholders. Receivers report that the concern has been operating at a profit for the past two years, and that the organization showed a profit of $12,000 during March of this year.

Cabot Opens Akron Office

Announcement is made by Godfrey L. Cabot, Inc., of Boston, manufacturer of Carbon Black that an office has been opened in Room 611, Metropolitan Building, Akron, Ohio, to better serve the Middle West trade. Manufacturers in this district are cordially invited to call at the new office.

CLEVELAND DEALERS FAVOR LOWER PRICES

Cleveland Association Issues Statment Declaring Its Opposition to Action of the National Association in Censuring Firestone for Decreasing Tire Prices.

At the regular monthly meeting of the Cleveland Tire Dealers' Association, held at the Hotel Winton on Wednesday, July 11, resolutions were adopted showing the lack of agreement of that association with the action of the National Tire Dealers' Association which at its recent meeting in Chicago severely censured the Firestone Tire & Rubber Co., for starting a general tire price decline movement, as reported on page 257 of the July 10 issue of THE RUBBER AGE.

The Cleveland tire dealers believe that any attempt to dictate or govern the manufacturers prices is prejudicial to the best interests of both the dealer and the tire industry as a whole, an attitude which is directly opposite to that of the National Tire Dealers' Association which went on record as opposed to any change in tire prices at this time.

Coming, as this action does, right on top of what seemed to be a general feeling in support of the action of the National association by dealers throughout the country, it is feared that further unrest will be felt among dealers—an attitude which the tire industry as a whole can ill afford at this time.

The resolutions and the platform adopted by the Cleveland dealers follows:

That whereas, The Cleveland Association of Tire Dealers believes any attempt to dictate or govern the manufacturers prices is prejudicial to the interests of both the dealer and the industry as a whole, be it,

RESOLVED — That the Cleveland Tire Dealers' Association publicly record its unalterable opposition to, and lack of sympathy with any effort to dictate or govern the manufacturers price and does declare itself out of sympathy with and opposed to the resolution adopted by the board of directors of the National Tire Dealers' Association at their meeting in Chicago on June 19th, which resolution censured and condemned the Firestone Tire & Rubber Co., for its leadership in the recent reduction in prices, and be it, further,

RESOLVED — That the Secretary be and he is hereby instructed to give as wide publicity as possible to this resolution, including the mailing of a copy to members of this association and to all Tire Manufacturers.

That, whereas, not only a great many dealers, but quite a few manufacturers appear to be disturbed over recent reductions and uncertainty as to their future course, be it,

RESOLVED — That the Cleveland Tire Dealers' Association go on record as not only approving the recent price reduction, but awaiting with a hearty welcome an even lower consumer price if it is possible without jeopardizing quality and after the elmination of all unnecessary and useless sales and distribution expense leave a reasonable and just profit to the manufacturer. We believe that a further reduction will serve at least two very essential and desirable ends—the assurance of the respect and confidence of the consumer and the reduction to minimum of the discount *hogs*, *promoters* and *gyps*.

The Platform

No. 1—The lowest possible price to consumer consistent with good quality and a just and reasonable profit.

No. 2—The elimination of all middle men and agencies. Marketing the product directly and exclusively through dealers.

No. 3—Exclusive 100% representatives, properly regulated and adequately protected.

No. 4—Dealer cost based on volume.

No. 5—Elimination of special datings and the application of credit rules individually instead of collectively.

No. 6—Frequent and frank exchanges of experiences and suggestions between manufacturers and dealer.

No. 7—Co-operation to the fullest extent, sincerely and unselfishly for the maximum success and progress of the Industry

No. 8—In so far as possible to coordinate all efforts having for their objective increased and permanent consumer respect, confidence and good will.

BURBANK AND RUBBER TREES

Is man wiser than nature? Luther Burbank says that he is not, but adds that man can use nature's help in getting what he wants. In fact Mr. Burbank claims that nature never produced an article which man could not improve—from the standpoint of his own needs. Mr. Burbank gives a long list of plants that have been improved, improved beyond all resemblance to their old natural form. In regards to the rubber tree he adds:

A rubber tree can be produced in 10 or 20 years that will yield more and better rubber than any tree that now grows upon this earth. I know that this can be done, because I know that the same natural laws rule in the jungle that prevail in the United States where I have worked for sixty years.

That statement from this well known horticulturist should have some bearing upon the possibilities of cultivating rubber trees in the United States. The Government has already established experimental stations and those interested in the development of rubber plantations in this country should not be too hasty in expressing their opinions. Burbank states that it may take from 10 to 20 years to produce the desired tree, but still he believes that the tree can be produced.

ENGLISH RUBBER DIPLOMAS FOR TECHNICAL WORKERS

Institution of Rubber Industry, London, proposes to honor those who have grasped the general principles of rubber manufacture by awarding diplomas to applicants having 10-years of rubber works experience. The candidate, according to the Institute's scheme, may choose to be examined in one of two subjects: That dealing with the special applications of engineering in the rubber industry, or that dealing with special chemistry or physics necessary to carry out the duties of a works laboratory. All candidates must produce evidence of being properly qualified before being admitted to the examination. Should the applicant have a diploma in one of the two courses the period of practical experience is reduced to 3 years.

Although the institution has only been in existence for 2 years, it has 465 members. Papers are read at regular meetings by experts and are published in a yearbook form. At present lectures are held in London, Manchester and Birmingham. The Institution purposes, and is soliciting funds, to extend the lecture courses to other centers in England and Scotland. The motive behind the institution's lecture courses and examinations is to provide technically efficient men for the rubber industry. The rubber trade, manufacturers claim, must adapt itself to the rapidly progressing times.

Hodgman Buys Paramount

The Hodgman Rubber Co., Tuckahoe, N. Y., recently acquired 50 per cent of the common stock of the Paramount Rubber Co. This was brought about through an exchange of common stock. The Paramount Company owns a number of patents covering the manufacture of hollow rubber goods, including that under which the Spalding tennis balls are made. Hodgman will continue to manufacture all articles formerly produced by the Paramount Rubber Co.

Paramount To Operate In Canada

The Paramount Rubber Co., Ltd., of Canada and a subsidiary of the Paramount Rubber Company of Little Falls, N. J., recently taken over by the Hodgman Rubber Co., N. Y. City, will be established in Canada to develop Canadian business, and to look after the export trade to various parts of the British Empire. The Canadian company will take over the plants of the Regal Rubber Co. at Sherbrooke and will commence production at an early date. A number of large contracts which the American company had in the Canadian field will be turned over to the Canadian corporation.

Goodyear's Production Up

Output of the Goodyear Tire and Rubber Company for the first five months of 1923 was 2,950,987 tires, against 2,297,640 tires for the corresponding period in 1922, 3,356,626 tubes against 2,339,419 in 1922 and 33,006,014 pairs of heels against 18,843,497 pairs last year.

QUEZON OPPOSES RUBBER PLANTATIONS IN PHILIPPINES

President Quezon of the Philippines senate in a recent address in Mindanao said that he opposed the exploitation of the rubber industry in the Philippines. "Governor Woods," he said, "has recommended to the legislature the approval of a law granting large leases on lands for the exploitation of rubber. But we do not care for the recommendations of the governor general, if they are in national conflict. We maintain that great areas of land should not be granted either to foreigners or Filipinos, because the public lands were created by God and not to profit, to hold, but to provide everybody a share.

"Our policy in this regard is to preserve our natural resourses for posterity."

To Build in Akron

The Loewenthal Scrap Rubber Co. will resume operations in a building rented from the Erie Railroad Co., State Street, Akron, Ohio. The concern's rubber warehouse was recently burned down in Chicago, and with the assistance of E. E. Helm of the industrial bureau of the Akron Chamber of Commerce, it is said that the Loewenthal company is contemplating erecting a $40,000 building in Akron.

Salesroom To Be Closed

Although the Naugatuck Chamber of Commerce protested against the closing of the United States Rubber Company's salesroom in that city to all but employees of local plants, it is stated that the rooms will be closed according to a recently established policy of that organization. In a statement recently issued by the U. S. Rubber Co. it is said that no exception could be made so far as Naugatuck is concerned.

Roads Reduce Damage Claims

The American Railway Association, freight claim division, states that the railroads are making progress in speeding up claim settlements and reducing economic waste involved in freight loss and damage. The amount of freight loss and damage claims for 1922 is estimated at $44,500,000, a decrease of 51.8 per cent, compared with 1921. In 1919 freight loss and damage claims totaled $104,587,000. During 1921 the monthly average of unsettled claims on hand were 344,074, against 242,409 in 1922, a decrease of 29.5 per cent. In 1922 there were but 2,351,000 freight loss and damage claims presented, against 2,632,000 in 1921, and 4,800,000 in 1920.

New Fabric Mill at Hogansville

The International Cotton Mills Company, Boston, has organized a subsidiary to be known as the Stark Mills of Massachusetts. The new company will have a capitalization of $4,000,000, $2,000,000 of which will be in 7 per cent preferred stock which will be used to finance a new Southern mill, while the remaining $2,000,000 of common stock will be retained by The International Cotton Mills Company.

The new plant will be erected at Hogansville, Ga., and will furnish about 250,000 square feet of space. Work has already begun on the new plant and production should start in a small way early next year. The cost of the new plant will be about $2,000,000.

The new plant will manufacture tire fabric formerly made at the International's Lowell plant. Existing tire fabric machinery will be moved South from Lowell.

Brunswick to Incorporate in N. Y.

The Brunswick Tire Company, a subsidiary of the Brunswick, Balke, Collender Co., is about to be incorporated under the laws of New York State. Erroneous reports have been circulating throughout the trade that the parent company is about to discontinue its tire department. Officials of the company state that all such reports or rumors are untrue, and that the new corporation will continue to manufacture Brunswick tires.

Kelly Leaves Akron

The Kelly-Springfield plant at Akron, Ohio, has turned out its last Kelly tire. Henceforth the company's plant at Cumberland, Md., will produce all Kelly products. The Kelly company had planned for some time to make this change in its program, and it was reported several times that the Akron plant was to be closed.

Rubber Type For Children

The Import Toy and Specialty Company, 10 East 16th Street, New York City, is now exhibiting printers sets for children. The type is of rubber and can be inserted into a wooden stick. The cheaper sets contain 2 alphabets, 2 sets of numbers and one stamp, while the more expensive sets have 7 complete alphabets as well as fancy rubber and ink stamps. A recent novelty that the company is exhibiting are red rubber toy animals for nursery purposes.

Converse Has Good Year

For the year ending March 31, 1923 the Converse Rubber Shoe Co., Malden, Mass., reports net profits of $498,677, as compared with $427.679 for the year ending December 31, 1921. Sales of the year totaled $5,746,876. The tire plant has a capacity of 350 casings and 1,000 tubes daily.

Extra N. J. Zinc Dividend

New Jersey Zinc Company has declared an extra dividend of 2 per cent in addition to the regular quarterly dividend of 2 per cent. Extra dividend is payable July 10 to stock holders of record noon June 30, and the regular dividend is payable August 10 to stock holders of record at close of business, July 31.

SANTO DOMINGO RUBBER MARKET SUPPLIED BY U. S.

About 85 per cent of the rubber goods imported into the Island of Santo Domingo come from the United States. In 1921 according to a monograph issued by the Department of Commerce, imports totaled $211,757, of which the United States supplied $185,269, France 12,753 and Porto Rico $12,986. Actual statistics are available only for the Dominican Republic, although the import trade of Haiti is said to follow the same channels.

In 1922 the Dominican Republic took 8,916 casings, valued at $116,312, while Haiti imported 2,177 casings valued at 29,297. The Dominican Republic has 1,800 passenger motor vehicles, 325 trucks and 70 motorcycles, compared with 600 pleasure cars in Haiti, 81 trucks and 40 motorcycles. About 60 per cent of the passenger cars in use take clincher tires, and the remainder take straight sides. Popular clincher sizes are 30 x 3½ and 31 x 4. Of the straight sides 32 x 4, 32 x 4½ and 33 x 4 are in demand. Red inner tubes are more popular than the grey ones.

As Santo Domingo is primarily an agricultural community the demand for rubber belting is not very heavy. Between the two countries there were only 5,003 pounds of belting imported, valued at $3,355. However, there is a better demand for canvas rubber-soled shoes. In 1922, the Dominicans took 17,387 pairs, valued at $16,820, whereas the Haitians took but 1,537 pairs, valued at $1,973. In 1921 the two countries imported 30,420 pairs of rubber shoes, the Dominican Republic taking 18,733 pairs, valued at $23,473.

Sundries and specialties are handled by the drug and department stores, the demand for this class of goods between the two countries in 1922 totaling about $1,800, against $16,600 in 1920.

General's Sales Mount

Gross sales for the first six months of 1923 of The General Tire and Rubber Company, Akron, O., were 75 per cent greater than in corresponding period in the preceding year, it being estimated that gross sales for the current year will exceed $10,000,000, compared with $7,500,000 last year. General's three new plants are still operating at capacity, demands for its product exceeding its output. Directors of the company recently declared its regular quarterly dividend of 1¾ per cent on its preferred stock, payable July 1.

Paul Plans To Build

Officials of the Paul Rubber Co., Charlotte, N. C., are said to be planning to add another addition to their plant. This is the result, it is said, of a selling system inaugurated by the company earlier in the year. At present, the company has 45 people working in the office, compared with less than half a dozen at the beginning of the year. The company's plant is said to be operating at about capacity.

RESTRICTION ACT WILL BE ENFORCED

In a Statement to THE RUBBER AGE, F. T. P. Waterhouse Says that Rubber Restriction Will Be Continued Until Success is Attained—Rubber Stocks Low.

The British will enforce the Restriction Act, and they will stick to it until tney have made a success of it. This is the concensus of opinion among leading British Rubber men, according to Frederick T. P. Waterhouse, president of the Fred Waterhouse Co., Ltd., who has just returned from London. Mr. Waterhouse states that should the British remove the restriction barrier, the moral effect would cause a big drop in prices of crude rubber.

At present, Mr. Waterhouse states, the rubber market in London is very dull. Tne outlook for future business in London largely depends upon the consumption of crude rubber in the United States. Should the consumption in the United States be as large as it was last year, then prices of crude rubber will be higher in the Fall.

The British, he asserts, are tightening up the leakages. The leakages, however, have not been as large as has been reported. In 2 or 3 years, Mr. Waterhouse says, the effect of the Restriction Act will bring results. At present stocks of crude rubber in Singapore and other primary markets are distinctly low.

Reports coming from the Federated Malay States state that the British are fining and confiscating the excess rubber of rubber "bootleggers." In one case the smuggler was fined $250; in another case the offender was fined $350, the rubber of both parties being confiscated. Other arrests are anticipated, Chinese being in most cases tne principal offenders. The *Straits Echo*, however, declares that large quantities of rubber have been shipped out of the Federated Malay States on false Siamese permits purporting that the duty had been paid at Sedua. That periodical also states that "professional offenders appear to be a legion at present."

Federal's Production Steady

About 6,000 automobile and 3,000 bicycle tires are being turned out daily by the Federal Rubber Manufacturing Co., Milwaukee, Wis. Sales of accessories, such as radiator hose, bumpers and various other specialties, have also been satisfactory, while, according to vice-president H. A. Githens, the company is doing a fair volume of business in the South.

New Chemical Circular

Chemists in general will be interested in the Reprint and Circular Series of the National Research Council, a pamphlet of which has just been issued, and which lists chemicals used in biological stains and indicators, vital stains and hydron ion indicators. In compiling this list the so-called "heavy chemicals" have been omitted because there are so many recognized manufacturers and dealers from whom they may be secured. For the same reason practically all inorganic salts are omitted, as are the "Analyzed Reagents." The Committee of Reseach Chemicals was composed of the following members: W. D. Collins, chairman, C. J. West, secretary, Roger Adams, B. D. Bradner, H. T. Clarke, W. F. Hillebrand and G. C. Spencer.

Bean Joins Wishnick-Tumpeer

F. C. Bean, former superintendent of the Blekre Tire & Rubber Co., St. Paul, Minn., is now a member of the sales force of the Wishnick-Tumpeer Chemical Company with offices in the Bush Building, N. Y. City. It is the intention of the Wishnick-Tumpeer Company to open up a rubber department under the supervision of Mr. Bean. Officials also say that a complete stock of standard rubber pigments will be carried for the convenience of Eastern rubber manufacturers. For a number of years Mr. Bean was with the Miller Rubber Co., Akron, Ohio.

New Lambert Plant Opens

The new plant of the Lambert Tire Co., Barberton, O., was formally opened on June 29. According to officials of the company this new addition will increase tire production by more than 75 per cent. Plans are being made to erect a large fireproof factory next year.

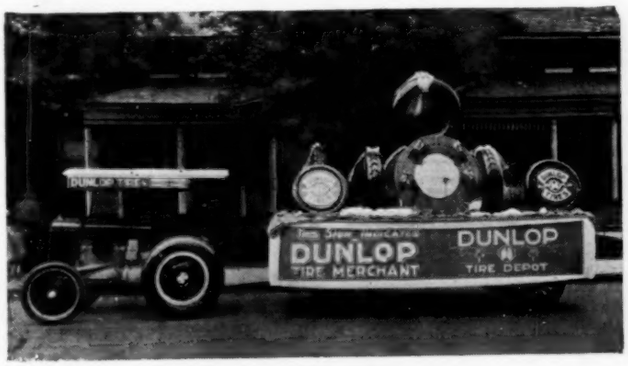
FORD MAY PURCHASE COTTON MILL RUMORED

Henry Ford is again reported to be a probable purchaser of a cotton or tire company. The latest rumor is that Mr. Ford is negotiating to purchase the Langley Cotton Mills at Langley, South Carolina. W. C. Langley, head of that organization, said that some negotiations for the sales of the company's property were under way, but also added that he did not know that Mr. Ford was involved. Several of the New York dailies recently stated that "it has been rumored that Mr. Ford was in the market for cotton mill properties in connection with his plant to produce his own tires."

Inquiry Stirs Pomona

Rumors are circulated about Pomona, California, to the effect that the National Consolidated Rubber Company of San Francisco is contemplating moving to Southern California. J. M. Paige, secretary of the Pomona Chamber of Commerce is said to have received the following telegram from a representative of the company at San Francisco: "Contemplating moving to Southern California. Have complete plant and equipment manufacturing rubber products. Employs 200. Must have plant with minimum space of 20,000 feet. Have you such property available in Pomona?" The city has not such a plant available, but the secretary of the Chamber of Commerce suggested that the company's representative visit Pomona.

Tractor Uses Dunlop Cords



Dunlop Float Using Cord Tires

The first tractor, equipped with pneumatic tires, ran on Danforth Avenue, Toronto, on June 19. The tractor was exhibited in a parade attended by 150,000 people. The innovation created a great deal of interest, and was awarded first prize out of one hundred and fifty other floats. The tractor was equipped with Dunlop cords.

U. S. Promotes Laliberte

Announcement has been made by the United States Rubber Company that William J. Laliberte has been appointed manager of the company's Des Moines, Iowa, branch, succeeding P. G. Campbell who died on June 2. Mr. Laliberte has been in the employ of the U. S. Rubber Company for about 9 years. During the illness of Mr. Campbell he was acting manager.

New Officers Elected

The Chicago City Rubber Works has announced that J. Jozwiak has been elected president of that organization, succeeding J. P. Drish, while S. Wlekinski becomes vice-president, replacing J. Jozwiak. Mr. S. Strzelcki will act as treasurer and general manager. Officers were elected by the board of directors at their last annual meeting held on May 31, 1923.

ADVERTISING PRICE DECLINES CRITICIZED

In a Letter to Tire Dealers W. O'Neil Urges Concerted Action to Prevent Manufacturers From Advertising General Tire Price Declines.

William O'Neil, vice-president and general manager of the General Tire and Rubber Company, Akron, O., has severely scored the practice of tire manufactures in reducing prices to dealers and then advertising this fact to the public. Mr. O'Neil says that it is not fair for the manufacturer to rush into print as soon as he reduces dealer's prices. In fact Mr. O'Neil has addressed a letter to about 132,000 tire dealers denouncing this "ethical breach" by tire manufacturers.

Do Tires Belong to Dealers?

The letter addressed to tire dealers follows in part: "Do you believe that the manufacturer of tires is within his rights when by advertising he reduces the value of all tires in your stock including those on which you are not protected and will receive no rebate? The question simmers down to this — when you buy your tires, are they yours or do they still belong to the manufacturer to juggle as he pleases without regard to your best interests? When a manufacturer advertises a lower price on your goods, does that help sales?

"The tire business has been struggling back to normaley and stability since the black days of 1920. Blunders and lack of foresight caused the casualities then, disorganizing, even destroying great manufacturing concerns, causing enormous dealer mortality. Recently dealers have begun to believe that business is stabilizing again.

"Now comes a blunder and ethical breach by a tire manufacturer, to unsettle the market, to decrease instead of increase sales, and to cause a new loss of confidence by the consumer in the dealer, and by the dealer in the manufacturer."

Mr. O'Neil further goes on to urge dealers to exert their influence among tire manufacturers to stop the practice of advertising price declines. He urges that protection be demanded of manufacturers; that the matter be discussed at tire dealer association meetings and that dealers write to the Rubber Association urging a course that will assist in stabilizing merchandising.

New Folder on Trolleys

A folder on trolleys, of interest to rubber manufacturers, has just been issued covering the new Yale Trolleys. It contains, in addition to detailed descriptions of the plain and geared types of the new Yale Steel Plate Roller Bearing Trolleys, a description of the new Yale Cast-iron Trolley. Incorporated in it are the details of very interesting tests to which the new Steel Plate Trolley was subjected, and a complete list of the material-handling equipment manufactured by the Yale & Towne Mfg. Co., Stamford, Conn.

Chemistry Bureau Gets New Chief

Secretary Wallace of the Department of Agriculture has announced that Dr. Charles A. Brown has been appointed chief of the Bureau of Chemistry. In 1907 Dr. Brown was connected with that bureau, but resigned to accept a position with the New York Sugar Trade Laboratory, Inc., of which he is now the chief chemist. Dr. Brown will assume his new duties sometime during the Fall.

Dr. Brown is well known among those interested in agricultural chemistry, being an associate editor of the Journal of the American Chemical Society. He is the author of a number of text books and bulletins on chemical subjects.

MAY RUBBER EXPORTS DECREASE SLIGHTLY

Below Those of March and April in Value but Better than Those of Other Months Since the Beginning of Deflation

May exports of rubber goods from the United States, valued at $3,431,676, were below the values of such exports in March and April, 1923, and also below those of May, 1922, but they exceeded those of any other month since the beginning of the deflation period of 1921, according to figures compiled by the Department of Commerce.

For the eleven months ended May 31, 1923, exports of rubber goods from the United States were valued at $34,408,643, an increase of $6,562,601 over the corresponding period of the previous year.

May exports were marked by slightly increased tire prices, the unit value of the 134,667 casings shipped being $10.95, as compared with $10.28 in April, and the unit value of tubes $1.72, as compared with $1.56 in April, while solid tires were valued at $25.46 each, as compared with $24.59 in the previous month. Cable advices show that Michelin reduced tire prices 10 per cent in the United Kingdom, effective July 2, 8 per cent in Holland July 6, 12 per cent in Switzerland, July 1 and 10 per cent in France, July 1, indicate that the tire price competition in foreign markets has not yet run its course.

Kelly Closes For Inventory

On June 30 the Cumberland plant of the Kelly-Springfield Tire Co. closed for a period of 10 days. A notice posted at the plant stated that the shut down was for the purpose of taking inventory. A number of the company's Akron employes are now in Cumberland, and expect to take places in the Kelly plant there.

Resolution of Board of Directors of Rubber Association Commemorating Death of Mr. Horace DeLisser

At a meeting of the Board of Directors of The Rubber Association of America, Inc., held on Friday, June 29, 1923, the following resolution was unanimously adopted:

WHEREAS — We have learned with profound sorrow of the death of our President and beloved business Associate, Mr. Horace DeLisser, Chairman of the Board of The Ajax Rubber Co., Inc., who began the Great Adventure on June 27, 1923; and

WHEREAS — Mr. DeLisser was a pioneer in the rubber and tire manufacturing industry of the United States, having, through his capability, vision and constructive effort, contributed in no small way to the successful development of that industry; and

WHEREAS — his unusually lovable personality, his kindliness, integrity and general good-fellowship established him as a highly respected and outstanding character and fitted him particularly for active leadership in co-operative effort by the rubber industry through The Rubber Association of America, Inc., the responsibilities of which he admirably fulfilled it is therefore

RESOLVED — That we, the members of the Board of Directors of The Rubber Association of America, Inc., for ourselves as individuals, and in behalf of the membership of the Association, express our deep sense of irreparable loss in the passing of Mr. DeLisser; and it is further

RESOLVED — That a copy of this resolution be spread upon the minutes of this Board and that a copy be engrossed and forwarded to the bereaved family.

RECENT IMPORT DUTIES LEVIED ON RUBBER GOODS

Dominican Republic

Import duties are the same for all countries, no preferences being accorded.

The duties are payable in United States currency or in its equivalent in Dominican coin at the rate of five Dominican dollars for one American dollar, or at the rate that may subsequently be established by law.

Rubber goods dutiable by weight shall be dutiable upon net weight, which shall not include any common exterior cover, receptacle, wrapper or packing, but shall include all interior or immediate receptacles. The metric system of weights and measures is in use; the kilo equals 2.2046 pounds avoirdupois.

Tariff No.	Articles.	RATE OF DUTY U. S. Dollars.
1045	Rubber, crude and waste, scrap or refuse rubber. Per net kilo	$0.10
	(a) Rubber or gutta percha in sheets, mixed or combined or not with other material, for machinery packing	Free
	(b) Packing for machinery, not in sheets, of pure rubber or combined with any other material, including packing for pistons, valves, etc., and rings, discs, gaskets, and washers	Free
	(c) Driving belts, of rubber, combined or not, with other material	Free
	(d) Hose of rubber, combined with other material	Free
1046	Tubing of rubber or gutta percha, combined or not with other material, with or without accessories. Per net kilo	$0.60
	(a) Rubber tires, combined or not with other material, and inner tubing thereof, for wheels of carriages, passenger automobiles, bicycles, etc. Per 100 net kilos	$12.50
	(b) Tires and inner tubes of rubber for auto trucks	Free
	(NOTE: In case that it is not definitely proved that the tires are exclusively for auto trucks, they shall be classified according to paragraph 1046 (a). Inner tubes, of less than 11½ millimeters in diameter shall always be classified under paragraph (1046 (a).)	
	(c) Rubber hat forms	Free
	(d) Floor cloth, or door or floor mats of rubber, combined or not with other material. Per net kilo	$0.25
	(e) Rubber boots and shoes, combined or not with other material. Per net kilo	$0.25
	(f) Water bottles, fountain syringes, ice caps, bags and urinals of soft rubber. Per net kilo	$0.40
	(g) Soft rubber nipples, accessories for nursing bottles, teething rings and similar articles. Per net kilo	$0.60
	(h) Rubber types and stamps. Per net kilo	$0.80
	(i) Rubber erasers. Per net kilo	$0.40
	(j) All other articles and manufactures of soft rubber not mentioned elsewhere. Per net kilo	$1.00
1047	Hardened rubber paste for dental purposes, combined or not with color, metal powder or other substances:	
	(a) Rulers or measures of hard rubber, combined or not with soft rubber or other material. Per dozen	$0.50
	Plus, per net kilo	$1.00
	(b) Hard rubber penholders. Per dozen	$0.25
	Plus, per net kilo	$1.00
	(c) Same in fountain pens, with or without gold nibs and with ornaments or parts of gold, mother-of-pearl, silver or other metal. Per dozen	$6.00
	(d) Same with gold nibs and without ornaments, of any kind. Per dozen	$3.60
	(e) The same, with other nibs and without ornaments of any kind. Per dozen	$0.80
	(f) Hard rubber or imitations thereof in trays for photographic developing and other purposes. Per net kilo	$0.30
	(g) Hard rubber syringes and syringe tips. Per net kilo	$1.20
	(h) Hard rubber cigar or cigarette holders or mouth pieces, for pipes. Per net kilo	$1.75
	(i) Hard rubber combs, side combs, back combs, hair pins, hair ornaments. Per net kilo	$1.00
	(j) Other wares or articles of hard rubber not specially mentioned. Per net kilo	$1.50
440	Braces or suspenders of cotton, with or without elastic. Per dozen	$0.75
441	Cotton garters and arm bands, with or without elastic. Per dozen pairs	$0.25
442	Other articles made up of cotton elastic, ribbons, bands or tape with elastic. Per net kilo	$2.50
	(NOTE: Articles enumerated in paragraphs 440-442 inclusive, if combined, adorned, or beautified with gold, silver, or other metals or precious stones, will pay a surtax of 10% ad valorem.)	
449	Waterproof textile with rubber or caut-houc. Per net kilo	$0.30
450	Ponchos and blankets, made up with materials described in paragraph 449. Per dozen	$8.00
451	Coats, overcoats, and capes, made of materials described in paragraph 449. Per dozen	$12.00
452	Trousers or breeches, of materials described in paragraph 449. Per dozen	$3.00
453	Hats, caps, head gear covers, and similar small articles, of materials described in paragraph 449. Per dozen	$1.00
	NOTE: Articles enumerated in paragraphs 451, 452, and 453 shall pay 60% of the duty when they are for children.)	
454	Arm dress shields or arm-scye, made with materials described in paragraph 449, or with other cotton material. Per dozen pairs	$0.75
455	Articles not elsewhere provided for, manufactured of textile, of rubber or caoutchouc and cotton, or of textiles of cotton, waterproofed with rubber. Per net kilo	$0.45

Union of South Africa

This circular supersedes and cancels previous circulars on import duties of South Africa.

The Union of South Africa includes the Cape of Good Hope, Orange Free State, Transvaal, and Natal, while British South Africa is the term applied to the entire district under British jurisdiction in southern Africa.

The monetary unit in use in the Union of South Africa is the British pound sterling, equivalent to $4.866 in United States money at normal exchange, actual rate of exchange variable.

The import duties on rubber goods (with the exception of tires and tubes) into the Union of South Africa are ad valorem, levied on "Current Value," for customs purposes, is the true current value for home consumption in the open market of similar goods in the principal markets of the country from which and at the time at which the goods were imported, including carriage to ports of shipment and the cost of packing and packages, but not including agents' commission when such commission does not exceed 5 per cent. In no case shall the value for customs purposes be less than the cost of the goods to the importer at the port of shipment.

A rebate of Customs duties is granted on all goods and articles the growth, produce, or manufacture of the United Kingdom (including the Channel Islands), or reciprocating British Colonies, imported therefrom into the Union for consumption therein to the extent of 3 per cent, ad valorem on such goods and articles. Provided that the manufactured goods and articles in respect of which such rebate as aforesaid shall be granted shall be bona fide the manufactures of the United Kingdom or reciprocating British one-fourth of the value of such goods, and that in the event of any question arising as to whether any goods or ar- Colonies, to the extent of not less than ticles are entitled to any such rebate as aforesaid, the decision of the Minister in whom the control of the Customs Department is vested shall be final. The mere packing and bottling of foreign goods in the United Kingdom, even if the work entailed therein amounts to more than 25 per cent of the total value of such goods shall not qualify them for preferential treatment; such goods must at least have been subjected to some process of manufacture in the United Kingdom or reciprocating British Colony.

Tariff No.	Article.	RATE OF DUTY General.	British Preferential
41	Rubber manufactures:		
	(a) Pneumatic tires and tubes—		
	(1) Tires, including weight of immediate wrapper (per pound)	1s.	9d.
	(2) Tubes for motor cars (per pound, net weight)	8d.	6d.
	(3) Tubes for motor cycles and cycles (per pound, net weight)	1s.	9d.
	(b) Solid tires (per pound)	3d.	2d.
		(Ad valorem)	
52	Boots and shoes	30%	27%
83	Rubber rings for aerated water bottles, and for jars of common glass or earthenware	3%	Free
98	Rubberoid cement; rubberoid roofing; rubberoid and similar substances	3%	Free
107	Hose, transmission, garden, etc.	3%	Free
109	India rubber, unmanufactured, including sheets	3%	Free
114a	Valves, rubber; rubber rings for machinery; rubberine (printing apparatus)	3%	Free
114b	Rubber solution, imported solely for insulating purposes	3%	Free
119	Packing and lagging for engines, machinery, piping, and buildings	3%	Free
174	Life saving apparatus, belts and buoys	Free	Free
181	Public stores for Government use	Free	Free
188a	Surgical instruments and appliances, including: Bandages, catheters, douches, elastic hosiery, operating aprons, abdominal belts or supports, stomach tubes, syringes. (Rubber sheeting cannot be admitted under this class. Rubber gloves may in certain cases be admitted under this class.)	Free	Free
193	All wares and merchandise not elsewhere charged with duty, and not enumerated in the Free List, and not prohibited to be imported into the Union of South Africa. (Including, among other articles: Rubber tubing, rubber rings for hermetically sealing tins, rubberoid flooring, and toys.)	20%	17%

Smokeless Heaters For Firestone

The Firestone Rubber Co., Akron, O., is installing three new boilers of the Powdered Fuel System type. Only two other boilers of this type are in use at the present time, one being in Milwaukee and the other in Henry Ford's plant in Detroit, it is stated.

Automatic Mixing and Refining

By B. W. Elberson

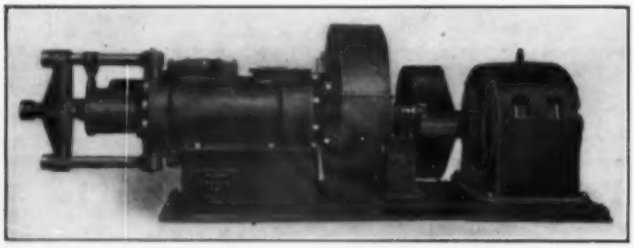
According to the author of this article, automatic mixing and refining is now becoming "all the rage". Twenty years ago Mr. Elberson installed this system in an English rubber factory against strong opposition. Those little machines, however, were mere toys compared to the present Banbury, Farrell and Eimco mixers and the Royle, Allen or Clarke 10 or 12 inch strainers. In a letter to the Editor, Mr. Elberson predicts that "in a few years there will be no such thing as mixing or refining on an open mill except for little odds and ends and specialties."

THE processes of automatic mixing and refining of stock in enclosed machines are not by any means new, being in fact old methods of preparing "dough" in proofing factories. Not only is amalgamation more rapid than on an ordinary mill, especially if light fluffy ingredients are employed, but also an economy in naptha is an important consideration.

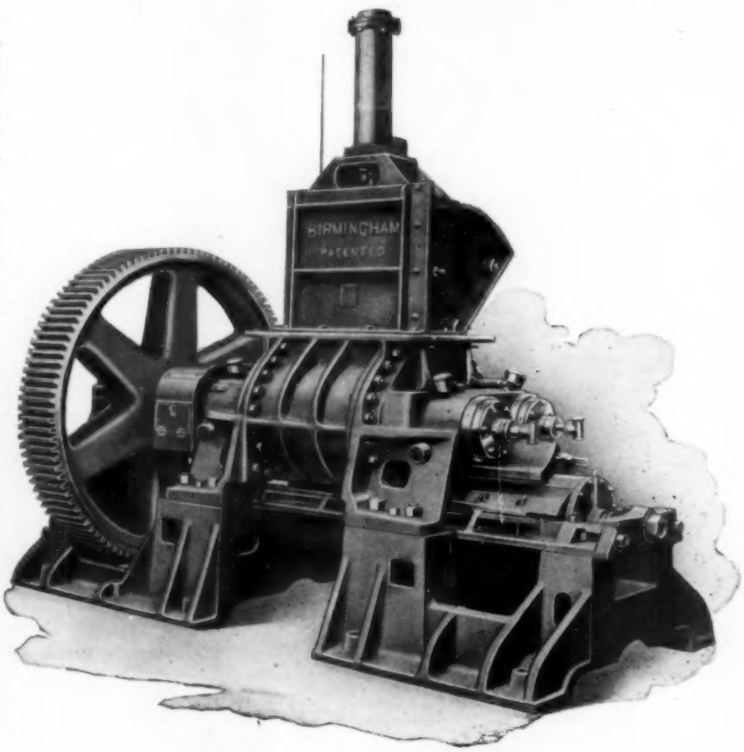
Straining or refining is of value if the batch contains reclaimed rubber, in that it thoroughly incorporates this rather difficult stock with the naphtha and mineral ingredients, and also eliminates wood and metal particles along with other objectionable substances. The "dough strainer," however, is not exactly the machine used for refining dry stocks, but the same principles are involved in the two.

American application has been on a large scale and the mixing of batches weighing 400 to 500 pounds is now carried on in many factories, also refiners with cylinders up to 12 inches diameter are not unusual, these machines having a capacity of many tons of stock a day. Perhaps of all the more recent rubber factory appliances, automatic mixers and refiners have been the slowest in taking hold, the chief objection to them being excessive heating of the stock (this is caused by rapid manipulation and the enclosed structure prevents a ready diffusion of heat.) This difficulty with enclosed refining was overcome by the use of a hollow screw for a circulation of cooling water. Different sizes of screens for different stocks also is a help in controlling the temperature.

Opinion has always differed somewhat as to the effect of high heat upon rubber when drying, grinding and mixing, but for the ordinary run of stocks there is perhaps little harm in this, unless during the latter process, or after it, the material is subjected to a temperature high enough to start vulcanization. The amount of working stock will, no doubt, have more effect than high temperature in deciding its tensile strength, toughness and aging qualities.



Allen Strainer

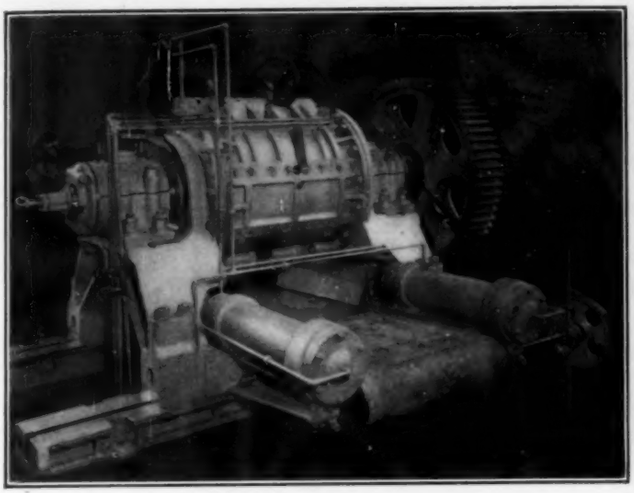


Birmingham-Banbury Internal Mixer

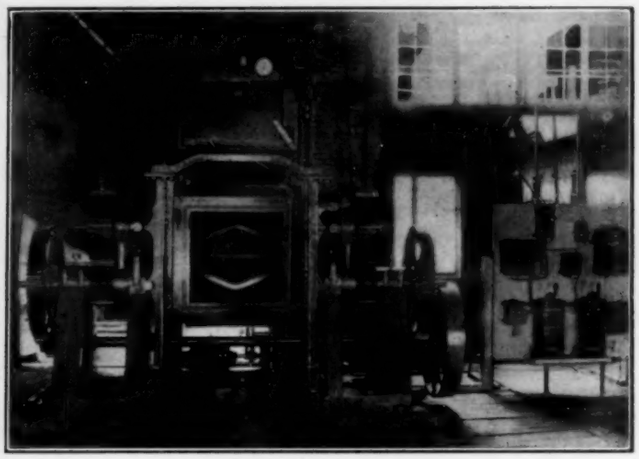
Tire mill and calendering practice is a pretty good illustration of the rough usage rubber will stand without injury, both for "working" and heating. It may be remembered that not so many years ago rubber men quite generally believed that a slow (almost dignified) mixing and calendering was necessary for best results and in vulcanization this idea also held. However, a new type of rubber man has developed along with the tire industry and many of the old mill-room notions are being dispelled. Mill and calender rolls running at a surface speed of from 30 to 40 yards a minute are now common enough, as is also the custom of wearing gloves by mill men, because stocks are too hot for the bare hands.

Having discussed what is looked upon by some as the objectionable features of the enclosed mixer it may be well to consider its advantages. To begin with the labor cost is at a minimum as compared with the ordinary mixing mill. This is because of simplicity of operation together with great volume of production. Greater cleanliness is also made possible, especially in working on light ingredients and colors.

Red and black open mixing being generally disliked, it is customary to pay double, or nearly so, for this class of work.



Farrell Masticator

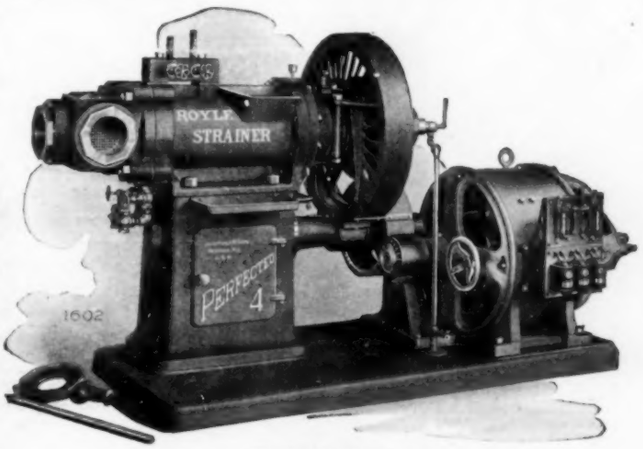


Eimco Internal Mixer Showing the Weight and Feeding Arrangement Raised and the Mixing Trough Tilted for Discharge of the Batch

Heat during mixing will cause no trouble if the sulphur or accelerators (or both) are added after mixing on the sheeting mill. Heat softens the rubber which enables it to assimilate the warm ingredients rapidly and with a minimum of horse power. Two men and two machines (i. e. an enclosed mixer and a sheeting mill) will produce from 2,500 to 3,000 pounds of stock per hour, which is about the capacity of six two roll mixers. In the matter of power consumption the first two will make a considerable better showing than the last six. To attain these favorable results it is necessary (if the mixes contain a large percentage) to break down the rubber before hand.

On mechanical and shoe factory work, rubber heel stocks, and where large quantities of carbon black for tire tread and the like are used the advantages of big batching are easily apparent, not only on the mill-room floor, but also in the compound room, if the plant is laid out for doing things in a big way.

The enclosed machines are now found in nearly all large and medium size plants which is proof of their merit and they are in line with modern factory practise which demands the utmost in production with least cost. Mechanical appliances for feeding and taking care of the output of these large machines, by the conveyor system, pneumatic hoist, or electric truck has had considerable to do with their success. It may be mentioned that an enclosed machine for washing rubber is also in use, which automatically cleans barky, sandy rubbers of the softer kinds, such as Sierra Leone, Ceara, Cameta, Manicoba, etc. A heavy machine is also used for Paras, Negrohead and the like.



Royle Strainer

Internal Mixer Defended by Mr. Banbury

Upon being shown the article on this page, Mr. F. H. Banbury, works manager of the Birmingham Iron Foundry, defends the Banbury Mixer and states that it does not overheat but that by proper operation it can be kept sufficiently cool to prevent spoiling the batch. Mr. Banbury says:

"The writer would like to challenge Mr. Elberson's statement that it is impossible to mix quick curing stocks in the Internal Mixer because of the high temperatures said to be a necessary characteristic of the internal mixer.

"Material can be mixed in the Banbury Mixer at as low a temperature as it can be mixed on a roll mill. There is nothing in our Internal Mixer that necessarily means mixing at a high temperature.

"We wish to dispel the idea that our Internal Mixer necessarily means high temperature. True it is an enclosed machine but so is an ice box or any refrigerated room. The chamber of our Internal Mixer is in fact a refrigerated chamber with a plentiful supply of water jacketed surface scientifically placed and with a minimum of thickness of iron between the cooling water and the rubber. In Birmingham-Banbury Internal Mixer the thickness of metal between the water and the rubber is very much less than the thickness of metal found on a roll mill between the cooling water and the rubber.

"It is true that we have burnt some stock in the Banbury Mixer, the same as roll mills have burnt some stock but we can overcome this in our internal mixer by attention to the following points:—(1) size of batch, (2) temperature and amount of cooling water, (3) speed of mixer."

Production Costs on Rubber Plantations
—*As Given by H. Eric Miller*

Letter from H. Eric Miller, Member of Stevenson Committee, Gives Valuable Figures on Plantation Costs

A COPY of a recent letter to H. Stuart Hotchkiss, Chairman of the Special Rubber Committee of The Rubber Association of America, from H. Eric Miller, member of the Stevenson Committee, brings forth some interesting facts in regards to probable costs of starting American-controlled rubber plantations.

Mr. Miller shows that about $300 per acre is necessary for land, development and equipment with an additional $200 to take care of interest charges (using 15% as a basis)until the trees are in bearing, i.e, for a period of seven years.

In its letter to members, the Rubber Association has the following to say: It must be borne in mind that there has been little new rubber planted for the past several years and that it takes at least six years for new areas to come into bearing.

From the practical standpoint, it is of prime importance that the American rubber manufacturer consider his future supply of raw material and at a fair or reasonable price. To attain this result encouragement must be extended to the planting industry.

The Special Committee of the Rubber Association in charge of the crude rubber restriction matter, has been primarily concerned with this long view of the situation and it is to be hoped that manufacturers and the public will realize that the question of present restriction sinks into insignificance as compared with the necessity of getting more acreage under rubber to provide for the future. Restriction can and will eventually be relaxed up to the point of the maximum possibilities of existing areas, but any demands in excess of this must come from new planting.

The Rubber Association of America, Inc., heartily indorses every effort to interest new capital in planting on the sound basis that investments be made with a full knowledge of the facts so that when new plantations are established they will be permanent producers and the effort will not be wasted because of having made a non-competitive or uneconomic start.

The Complete Letter

As promised I will endeavor to summarize for you the main facts which it is necessary to bring into account when considering the price which Rubber must sell at in order to attract additional capital.—

In the first place let us look at the capital outlay which has to be faced in order to open, develop, and equip for production a Rubber Estate of an economic size.—In order to get as accurate a figure as possible you must spread your investigation over a wide field.—Take the last Annual Report of the Rubber Growers Association, Page 8, and you will find a statement of the issued Capital of all the Company Members with the acreage planted or interplanted with Rubber owned by them.—Ceylon is not fairly representative as set out there because a number of the Ceylon Companies own tea estates not interplanted with rubber, and their issued Capital covers the ownership of these Tea Estates as well as of their Rubber Estates.—To a small extent this applies also to Java.—Neither of these countries offer the possibility of undertaking any large scale planting up of Rubber, and the main countries to look at are Malaya and Sumatra.—The issued capital of the 288 Malayan Companies works out at £58 per acre and in Sumatra the figure is exactly £60.—The statement of issued capital does not include debentures or reserves invested in the Estates but I think we can set those off against the very small amount of "water" represented in the issued capital.—Taking also into account the fact that most of the readily accessible land has been taken up, and that you have to go further afield to find suitable rubber land, I am absolutely satisfied that £60 per acre cash outlay is a conservative statement of what must be invested to bring an acre of rubber into being and into bearing properly equipped.—This figure allows for all the operations proceeding normally without any particular set-back, and doing the work thoroughly on recognized lines,—putting in permanent buildings with the factory equipment as at present customary.

Quite apart from the R.G.A. figures we have, as you know, a pretty wide experience of what can be done in the way of planting rubber and bringing it into bearing, and our own experience shows that £60 per acre is an under-statement rather than an over-statement.—There are exceptions to every rule, but bearing in mind the risks inseparable from any plantation operations in the tropics there are as many places where the cost is more than £60 per acre as there are with a lower cost.— In Borneo, another country where land is plentiful, the history of the Estates already in existence there shows a capitol cost well in excess of the average of £60 just mentioned, but I do not attach very much importance to that because the work has not been tackled there in what one would, in the light of present knowledge, describe as a thoroughly businesslike manner.—

Preparatory to writing you I have been through all the past history of one or two of our own companies which have been under our control right from the commencement of clearing operations, and without any abnormal difficulties £60 is under the actual cost because we generally close capital account before all the acreage is really self-supporting.—

A Return of 15% Needed

Secondly, as mentioned in the report of the R.G.A. Delegates a reasonable rate of interest must be allowed on the cash outlay during the period which elapses before any profit can be taken out of the business.—6% simple interest is the lowest rate you can take on an average of £35 per acre during 7 years from the word "go".—That in itself is no attraction to anyone.—You must have the practical certainty ahead of you of a really good return on your money after the long waiting period, and it would not be unreasonable to assume that unless there is at least an average of 15% on the money laid out from the time it is laid out the public would not consider it at all attractive.—The large amount of British Capital which was put into the Plantation Rubber Industry was attracted there not by a stolid 15%, but by the very much larger margin of profit which was obtainable in the earlier days of the Industry when rubber had a scarcity value.—The position today, is very difficult, production having outrun absorption to the point of rendering the Industry unprofitable and necessitating exceptional measures to cope with the crisis thus brought about.—A deal of faith is required to put new money into new Rubber Estates while substantial increase in the volume of Rubber which already existing Plantations are capable of giving during the next few years is looming ahead.—The real bait of very big profits is no longer there, and although enlightened folk inside the Industry, who visualize a still greater expansion in the consumption of Rubber, may be willing to put up the money for new planting, and although existing plantation Companies may carry out moderate extensions, I do not see any likelihood of large additional planting while the outlook is so uncertain.

Production Cost Close to 9d per Pound

Thirdly, I now deal with the question of cost of production after a close study of the 1922 accounts of between 80 and 90 Companies not selected but taken as they come (excluding however, Companies with mixed cultivation and confining myself to Rubber producing Companies pure and simple).—The year 1922 was a year of the utmost economy when staffs were kept down to the minimum and not a cent of expenditure incurred that could possibly be avoided.—The very lowest cost I can find for a Company operating in Malaya is 6d per lb. "all in" London, the average of the Malayan Companies is 8½d per lb. and that without any export duty during 10 months of the year, so this figure must be raised to 9d per lb. to include the current export duty which is likely to be maintained in one form or another.—

It is true that restriction was carried out voluntarily during 1922 by a number of the Companies under review but after going into the matter very carefully in regard to our own Estates it is not possible to think of maintaining costs even of a full crop at below the actual cost of 1922.—

In Ceylon, with its lower currency value, costs are as near as possible 1d per lb. less than in Malaya, but I have reason to believe that much less manuring was done there in 1922 than has been customary in previous years, and as I know Ceylon produced nearly a full crop in 1922, 8d per lb. "all in" is fairly representative of Ceylon average cost.—

The Dutch East Indies costs are on a par with Malaya, and we cannot produce full crops there any cheaper per lb. than we have brought down the cost of our restricted crops because we have been tapping only the best yielding areas and trees.—Furthermore, as soon as ever profits accrue, commissions to staff and local taxation come into the reckoning, both of which were absent last year except to a very small extent.

In these figures are included Head Office administration charges and depreciation on buildings and machinery, but no depreciation of the trees.—The life of the trees is limited, and in the Dutch East Indies the concessions are only for a specified number of years, and while the question of amortisation is not a pressing problem, provision should strictly speaking be made for that in reviewing the subject in the comprehensive way which you desire to do, something between ¼d and ½d per lb. should be allowed for on this account, and even in the countries where the tenure of land is virtually perpetual, a similar fund should be accumulated for eventual replacement of the existing trees when their productive life is run out.—

Yield is 360-400 Lbs. per Acre

Fourthly, we come to the question of what is the average number of lbs. of Rubber which an acre of Rubber may be relied on to yield after it attains maturity.—In the Delegates' Report we put down the figure of 400 lb., and subject to possible improvements which may be introduced in the average quality of Rubber trees planted hereafter by means of seed selection, bud-grafting, or otherwise, as to which we have so much to learn yet I say without hesitation that the existing area planted with Rubber in the middle East will not year in and year out give an average yield in excess of 400 lb. In this connection it may be useful to give you the result of an investigation made by the controller of Rubber Exports in Singapore just published in the F.M.S. Government Gazette of May 18th.—He investigated the crop produced by 555 Estates of over 200 acres each during 1919/20 a period of "all out" production, and making an equivalent allowance for the areas which were at that time not yet in full bearing, he arrives at a figure of 384 lb. as the average output per acre of fully mature Rubber.—None of us today would revert to the method of tapping which was customary in 1919/20 because we know that

(Continued on Page 308)

An Apparatus and Method for Determination of Resistance to Abrasion of Rubber Products

By W. W. Evans

Development Manager, The B. F. Goodrich Co.

RUBBER, in service, is nearly always subjected to some sort of abrasion—tires, belts, boots and shoes, hose, etc., all must resist abrasion—and in many cases resistance to abrasion determines the life of the article. It is important, therefore, that the manufacturer should know accurately the relative abrasion resisting properties of different compositions,

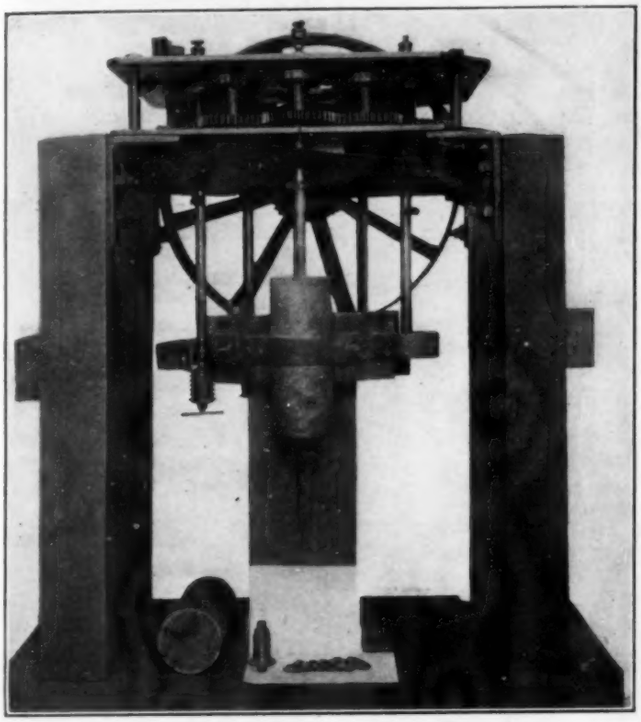


Fig. 1—Abrasion Apparatus for Rubber Products

and it is very desirable that these properties should be measured in the laboratory. It is not surprising then that for years persistent attempts have been made to develop a machine for this purpose.

Abrasion testing machines have been built in a variety of forms, but, in general, the sample is subjected to the action of a revolving abrasion wheel or disk. One of the objections to this type of machine is the difficulty of maintaining the surface of the abrasion wheel. The surface of the wheel or disk quickly becomes clogged with the compound under test, which changes the rate of abrasion. This difficulty has been overcome by two machines using this system, namely, that developed by the U. S. Bureau of Standards and the one used by the New Jersey Zinc Co. Comparative tests have been made between the latter machine and the one described in this paper, and it has been found that similar results can be obtained.

The machine described in this paper, developed by Mr. J. C. Sproull and co-workers in the Testing Laboratories of the B. F. Goodrich Co., is of a different type. The machine (Fig. 1) consists essentially of a train of ten identical spur gears all in mesh and arranged in circular form in a horizontal plane. The shafts of alternate gears, five in all, extend vertically downward, so that the machine somewhat resembles a multiple spindle drill-press. Fixtures carrying the test samples are attached to the bottom of the spindles, and are "buried" in loose abrasive material contained in cans as shown.

Detailed Description of Apparatus

The body of the mandred (Fig. 2) is 1 in. in diameter and 2⅞ in. long over all. This will take five samples of rubber when assembled for test. The mandrel is designed to be inverted, thus affording an equalized static pressure on all samples for the total test period. A small propeller arrangement has been made which is attached to the bottom of the mandrel, keeping the abrasive stirred up from the bottom of the can pending any tendency toward congestion of abrasive.

The spacing rings used between the samples are 3/16 in. wide, 1¼ in. in outside diameter and 1 in. in inside diameter. The guard rings placed at either end of the mandrel are 1 11/16 in. in outside diameter, 1 in. in inside diameter and ⅛ in. wide. The abrasive container is a can 3 in. in inside

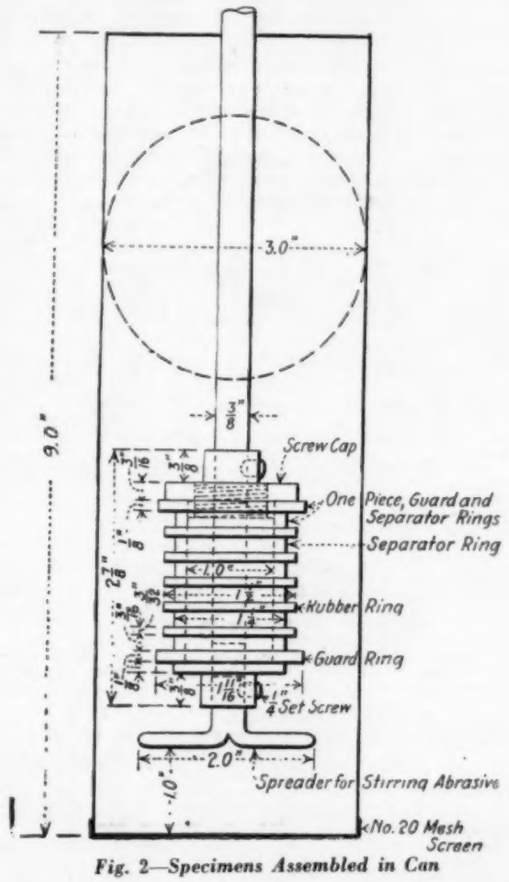


Fig. 2—Specimens Assembled in Can

diameter and 9 in. long. This shape has been chosen so as to reduce the amount of abrasive required to a minimum and yet afford a static head of about 5 in. above the top of the mandrel. A 20-mesh screen is soldered to the bottom of the container, which permits the abrasive dust to separate out.

As an abrasive we have found that a carborundum grain

*Presented at 26th Annual Meeting of A.S.T.M., Atlantic City, June 25-29, 1923.

between No. 6 and No. 8 mesh is most desirable. Crushed quartz of several varieties, steel grit, sand and alundum have been tried, but none are as satisfactory as the carborundum grain. In fact, we have found that steel grit and sand have very little abrasive actions on rubber in such a test. The carborundum grain may be used a number of times by re-screening.

Test samples are cut from sheets 3/32 in. thick with a die 1 in. in inside diameter and 1½ in. in outside diameter. Samples fit on a mandrel, the body of which is 1 in. in diameter and the rubber is not under tension when tested. We have followed the procedure of placing the standard compound in the center and two samples on either side.

For one mandrel, five test rings are prepared and weighed, and placed on the mandrel. As indicated above, four of these are of the unknown compositions and one standard. The mandrel is fastened to the end of the rotating shaft, the abrasive can be put in place and filled to the proper level, and the machine started. This operates at the approximate speed of 130 r.p.m. The test requires about eight hours. At the end of four hours, the machine is stopped and the mandrel reversed in its position, so that the two bottom rings are now the top rings. This gives all samples equal static head for the same period of time during the test. It is also desirable to replace the abrasive with fresh material at the end of this four-hour period. Table I records a typical series of tests.

TABLE I.—SAMPLE TEST CALCULATION OF RESISTANCE TO ABRASION DETERMINATION

Length of Run, 8 hours. Average Temperature in Cans, 150°F.
Room Temperature, 86°F. Speed of Mandrels, 130 r.p.m.

Compound	Can	Initial Weight, mg.	Loss in Weight, mg.	Loss in Weight, per cent	Index of Abrasive Resistance
A	No. 1	2481.0	531.0	21.37	759
B	No. 1	2714.0	519.0	19.12	848
C	No. 1	2707.0	509.0	18.81	862
D	No. 1	2380.0	470.0	19.79	819
Standard	No. 1	2780.0	450.0	16.22	1000
E	No. 1	2634.0	364.0	13.81	937
Standard	No. 1	1676.0	78.0	4.66	1000
E	No. 3	2680.0	385.0	14.37	349
Standard	No. 3	1637.0	82.0	5.01	1000
F	No. 2	2335.0	748.0	32.19	163
Standard	No. 2	1676.0	88.0	5.25	1000
F	No. 4	2440.0	810.0	33.21	166
Standard	No. 4	1630.0	90.0	5.52	1000

The samples are again weighed after the test, the loss determined and converted to an index number. The percentage loss of the standard compound is taken as 1000. The percentage loss of each experimental compound on the mandrel is divided into the percentage loss of the standard compound and multiplied by 1000. A compound with an index number of 1100 is, accordingly, better than the standard compound in resisting abrasion and one with an index number of 900 is not as good as the standard. It is unnecessary to obtain the specific gravity or the volume loss of each compound, since the percentage loss in weight is the same as the percentage loss in volume. Experience indicates that it is necessary to wear away 15 to 20 per cent of the original volume of the sample, in order to obtain consistent results.

One source of error is the difference in thickness of the test samples. Molded sheets used for this purpose are found to vary from 0.080 to 0.120 in. in thickness. The total area of rubber exposed to the abrasive on a sample 0.080 in. thick is 1.114 sq. in., and that for a sample 0.120 in. thick is 1.135 sq. in. The difference is 0.021 sq. in. or 1.88 per cent (based on thickness of 0.080 in.).

A test begun in one container should be completed in that container. Eccentricity of the shaft on which the mandrel is fastened will cause different degrees of wear in each container, if shafts and mandrels do not run perfectly true.

Some advantages claimed for this abrasion testing machine are as follows:

1. It is reasonably consistent. When a spool is loaded with samples all cut from the same sheet of rubber, the results check very closely.
2. The test samples are small enough to be cut from many finished articles.
3. The volume worn away from any given sample has little, if any, influence upon an adjacent sample.
4. Stiffness is not a factor.
5. Tests may be run in a reasonable time without excessive heating.
6. The abrasive can be screened and used repeatedly.
7. Local variations of the abrasive material, such as occur with abrasive wheels and disks, do not occur with the loose abrasive.

Production Costs on Rubber Plantations

(Continued from Page 306)

a lighter system of tapping is necessary in order to ensure adequate bark renewal, but I do believe that by nursing our trees judiciously we should be able to maintain an average yield of something between 360 and 400 lb. per acre.—On well managed Estates, excepting in South India where climatic conditions limit them to something like 200 lb. per acre, such as are covered by this F.M.S. Survey, much greater care is exercised over bark reserves than is the case on native holdings, and although for a short time native holdings give even higher yields than the figure mentioned they do, in the long run, not give such a high average.—

From the point of view of an investor in a new Estate the 400 lb. per acre figure is the only one that can be attained unless seed selection and bud-grafting make a pronounced difference on what has been achieved in the past, and it is this poundage of Rubber which has to produce the profits.—We, therefore, come to the following calculation of what is the minimum return which might satisfy an investor in Rubber Estates.— I doubt whether this yield would be sufficiently attractive to tempt people who don't understand the business to put new money into it, but that is a matter of opinion which you can weigh from a different angle, having in view the sort of return which American investors are able to secure in other lines of enterprise.—

The expenditure of £60 per acre on land, development, equipment, and bringing into bearing may be divided up approximately as follows:

1st Year	—	£20	plus 15%		£3
2nd Year	—	£10	" "	on £30	£4½
3rd Year	—	£ 5	" "	" £35	£5¼
4th Year	—	£ 5	" "	" £40	£6
5th Year	—	£ 5	" "	" £45	£6¾
6th Year	—	£15	" "	" £60	£9
		£60			£34½

As no revenue has yet been forthcoming you have really a debit of £34½ on your Investment Account, and as your Rubber trees are still only in partial bearing at this stage, and your Investment Account would have to be charged up with some of the interest which will not be covered by profits it is not far wrong to take £100 as representing your investment of cash plus interest of 15% until your Rubber trees are in full bearing.—This figure is capable of reduction if you are satisfied to take 10% interest instead of 15, which would reduce the total figure to £87.—

The cost price of each pound of Rubber c.i.f. is shown to be 9d per lb. in full bearing, therefore to maintain a yield of 15% on £100 you will require a net profit of 9d per lb.—All your Rubber is not first quality so that a profit of 9½d on your No. 1 quality is required.—Adding a ½d per lb. for amortisation you arrive at a market price of ½d per lb. for No. 1 grades in New York or London to give the 15% return.—As far as British Capital is concerned income tax will have to be paid by the investor out of that 15% which reduces the attractiveness of it considerably.—

I remember Mr. Barron, whom we travelled with on the "Olympic" most emphatically pointed out that the 6% which the Delegates put down in their calculation to cover interest on the money during the waiting period was altogether too low for American ideas, but to sum up a conservative basis all that I have written in this letter, a price of 1/6 d for No. 1 Rubber is the minimum that will satisfy investors' reasonable requirements.—

THE RUBBER GROWERS' ASSOCIATION, Inc.
FOURTEENTH REPORT OF THE COUNCIL TO THE MEMBERS OF THE ASSOCIATION.

The membership of the Association is 917, consisting of 534 Companies and 383 Individuals.

Statistics of the Companies represented by the Association are estimated as follows:—

No.	Companies operating in	Authorized Capital £	Issued Capital £	Acreage Owned	Acreage planted or interplanted Rubber
288	Malaya	46,701,364	38,256,594	968,042	664,871
98	Ceylon	19,091,079	15,834,772	388,730	145,096
42	Sumatra	17,566,900	11,540,579	535,145	192,133
38	Java	8,019,500	6,717,398	373,309	102,514
2	Dutch Misc.	265,300	229,543	33,294	4,930
15	India	2,244,000	2,103,027	73,548	36,898
8	Burma	840,150	626,328	18,259	13,486
21	Borneo	3,366,940	2,668,373	158,971	38,018
3	Other countries	156,850	139,136	12,544	4,072
515		98,252,083	78,115,750	2,561,842	1,202,018
6	Trust Companies	2,812,441	1,477,773		
		101,064,524	79,593,523		

Note.—Particulars of the acreage of 9 Private Estates are included in the above figures. There are also 13 Company Members not directly owning Rubber Estates.

A.S.T.M. Committee D-11 Report on Rubber Products

This Report Was Presented at the Recent Annual Meeting of Society and Vote Was Taken by Letter Ballot

THE following report of Committee D-11 on Rubber Products of the American Society for Testing Materials has been released by the society subsequent to the letter ballot vote of the committee which consists of 33 members, of whom 24 voted affirmatively, 0 negatively and 9 refrained from voting. The result of the vote was as follows:

Item	Affirmative	Negative	Not Voting
TENTATIVE STANDARDS RECOMMENDED FOR ADOPTION AS STANDARD			
Tentative Specifications for Cotton Rubber-Lined Fire Hose for Private Fire Department Use (D 14-22 T)	20	1	12
Tentative Specifications for Cotton Rubber-Lined Fire Hose for Public Fire Department Use (D 26-21 T)	18	1	14
Tentative Specifications for Rubber Gloves for Electrical Workers on Apparatus or Circuits not Exceeding 3000 Volts to Ground (D 120-22 T)	20	0	13
Tentative Specifications for Rubber Pump Valves (D 151-22 T)	20	2	11
PROPOSED REVISIONS OF TENTATIVE STANDARDS			
Tentative Specifications for Wrapped Air Hose for Use with Pneumatic Tools (D 46-21 T)	18	2	13
Tentative Specifications for Braided Air Hose for Use with Pneumatic Tools (D 60-21 T)	19	1	13
Tentative Specifications for Rubber Belting for Power Transmission (D 53-21 T)	23	0	10
Tentative Methods of Testing Rubber Products	31	0	2
PROPOSED NEW TENTATIVE STANDARDS			
Proposed Tentative Specifications for Wrapped Cold Water Hose	21	1	11
Proposed Tentative Specifications for Rubber Matting for Use Around Electrical Apparatus or Circuits not Exceeding 3000 Volts to Ground	22	1	10

THE committee has held two meetings during the year in addition to the one held during the recent annual meeting of the Society. Both were held in New York City, one on November 14, 1922, and the other on March 21, 1923.

Existing Tentative Standards

Of the twelve tentative standards on rubber products now before the Society, the committee recommends continuing five in the present status, revising three and advancing four to standard as follows:

Tentative Specifications for Insulated Wire and Cable: 30-per-cent Hevea Rubber (27-21 T).—The unification of all American specifications on electric wires and cables has been undertaken by the American Engineering Standards Committee and a large committee, consisting of over 130 members, is now actively at work on the undertaking. Committee D-11 recommends, therefore, that this tentative standard be continued as tentative.

Tentative Specifications for Steam Hose (D 54-21 T).—The committee has under consideration a revision of these specifications but is not prepared to make a recommendation at this time.

Tentative Specifications for Adhesive Tape for General Use for Electrical Purposes (D 69-22 T), and

Tentative Specifications for Rubber Insulating Tape (D 119-22 T).—Although no criticisms have been received of either of these two specifications and no revisions are contemplated, the committee recommends that they be continued as tentative as it is desired to secure the formal comments of certain other organizations particularly interested in these materials before proposing that these specifications be made standard.

Tentative Methods of Testing Rubber Products (D 15-22 T).[1]—No criticism of these methods have been received but in view of the study being given to rubber testing methods by other organizations at the present time, it is recommended that these methods be continued as tentative for the present with the following revisions:

Sections 61 (b).—Add a paragraph to read as follows:

"If the sample fails in this test, two additional samples shall be tested and if either of these fails, the entire lot of hose represented by the samples shall be considered to have failed to meet the specifications."

Add a new Section 62 to read as follows:

"*Other Types of Hose.*—In testing samples of other types of hose, the pressure shall be raised at the above rate until the prescribed pressure is reached and then held for the prescribed period, after which the pressure shall be increased at the same rate until failure occurs.

"If the sample fails in this test, two additional samples shall be tested and if either of these fails the entire lot of hose represented by the samples shall be considered to have failed to meet the specifications."

Tentative Specifications for Cotton Rubber-Lined Fire Hose for Private Fire Department Use (D 14-22T).[2]—No criticisms of these specifications have been received by the committee and it is recommended that the specifications be adopted by the Society as standard, with the following minor revisions:

Section 7.—Change the first sentence of this section from its present form: namely,

"Samples shall be taken both as regards number and location at the discretion of the inspector."

to read as follows, so as to make it more definite:

"A sample not less than 8 in. in length shall be taken from each lot of 500 ft. of hose or less for the tests specified in Sections 8 and 9."

Section 8 (b).—Insert a tolerance of ± 2° F. (1.1° C.) in the prescribed temperature of 158° F. (70° C.) for the dry heat test.

Tentative Specifications for Cotton Rubber-Lined Fire Hose for Public Fire Department Use (D 26-21 T).[3]—No criticisms of these specifications have been received by the committee and it is recommended that they be adopted by the Society as standard with the following minor revisions:

Section 7.—Make the same change as in Section 7 of Specifications D 14-22 T above.

Section 8 (b).—Make the same change as in Section 8 (*b*) of Specifications D 14-22 T above.

Tentative Specifications for Rubber Gloves for Electrical Workers on Apparatus or Circuits not Exceeding 3000 Volts to Ground (D 120-22 T).[4]—These specifications have been recommended by the Accident Prevention Committee of the National Electric Light Association to the membership of the Association. No criticism has been received during the year and the committtee now recommends that the specifications be advanced to standard.

Tentative Specifications for Rubber Pump Valves (D 151-22 T).[5]—No criticisms having been received of these specifications, it is recommended that they be advanced to standard.

Tentative Specifications for Wrapped Air Hose for Use with Pneumatic Tools (D 46-21 T).[6]—The following revisions are recommended in these specifications:

Section 6 (a).—Change from its present form: namely,

"The wire armor shall be 3/16 in. half-round galvanized steel wire, wrapped with ¼-in. space between adjacent turns."

to read as follows:

"For hose 1 in. or less in diameter, the wire armor shall be 5/32 by 1/16-in. half-elliptical, galvanized mild steel wire wrapped with a maximum space of ⅜ in. between adjacent turns. For hose over 1 in. in diameter, the wire armor shall be 3/16 by 3/32-in. half-round, galvanized mild steel wire wrapped with a maximum space of ⅜ in. between adjacent terms. Any other size of half-elliptical or half-round wire of equal or greater area may be used provided neither dimension varies more than 1/64 in. from that specified above."

Section 8.—Change to read as follows by the addition of the italicized words and figures and the omission of the word and figures in brackets:

A sample [52] *36* in. [long] *in length* shall be cut from each lot of 500 ft. of hose or less and subjected to the following tests."

Section 9.—Change to read as follows by the addition of the italicized words and figures and the omission of the words and figures in brackets:

[1] *Proceedings*, Am. Soc. Testing Mats., Vol 22, Part 1, p. 947 (1922).

[2] *Proceedings*, Am. Soc. Testing Mats., Vol. 22, Part I, p. 925 (1922).

[3] *Proceedings*, Am. Soc. Testing Mats., Vol. 21, p. 778 (1921).

[4] *Proceedings*, Am. Soc. Testing Mats., Vol. 22, Part I, p. 937 (1922).

[5] *Proceedings*, Am. Soc. Testing Mats., Vol. 22, Part I, p. 944 (1922).

[6] *Proceedings*, Am. Soc. Testing Mats., Vol. 21, p. 784 (1921).

"(a) *In the case of hose 1 in. or less in diameter*, the test specimens shall be cut longitudinally from the sample of the hose; *in the case of hose over 1 in. in diameter, the test specimens shall be cut transversely.*

(*b*) The tensile strength shall be not less than [1500] *800* lb. per sq. in. for the tube and [1300] *1000* lb. per sq. in. for the cover.

"(*c*) The elongation at the breaking load [for both the tube and the cover] shall be such that the original 2-in. gage length of the test specimens shall stretch to not less than [10½ in.] *7 in. in the case of the tube and 9 in. in the case of the cover.*

"(*d*) The set, or permanent elongation, following a stretch from 2 in. [to 9 in.] *to 5 in. in the case of the tube and from 2 in. to 7 in. in the case of the cover* shall not exceed 25 per cent."

Section 10.—Change from its present form: namely,

"The adhesion between the plies shall be determined by suspending a 15-lb. weight from the separated end of a ply of a 1-in. test ring cut from the 52-in. sample described in Section 8, the force being applied radially. The rate of separation of the plies shall be not greater than 1 in. per minute. The test shall extend for ten minutes when the size of the test ring permits."

to read as follows:

"The adhesion between plies shall be such that a weight of 18 lb. will not cause separation at a rate greater than 1 in. per minute. The adhesion between the cover and plies and also between the tube and the plies shall be such that a weight of 15 lb. will not cause separation at a rate greater than 1 in. per minute."

This change is recommended since the test procedure details now given in this section are superfluous, in view of the fact that they are covered in the standard procedure outlined in Methods D 15-22 T.

Section 11.—Change the first paragraph to read as follows by the addition of the italicized words and figures and the omission of the word and figures in brackets:

"From the [52-in.] *36 in.* sample, a piece of hose [3 *ft.*] *24 in.* long shall be taken and subjected to a hydrostatic test at the pressure specified in Table II for hose of its size."

Table II.—Change Table II on test pressures to read as follows by the addition of the italicized figures and the omission of the figures in brackets:

TABLE II.—TEST PRESSURES

Inside Diameter of Hose, in.	Test Pressure lb. per sq. in.
⅜	[750] *700*
7/16	[725] *675*
½	[700] *650*
⅝	[650] *625*
¾	[650] *625*
1	[600] *600*
1¼	[600] *575*
1¼	[550] *575*
1½	550

Section 14.—Insert a new Section 14 to read as follows, renumbering the subsequent sections accordingly:

"*Tolerances, Inside Diameter.*—The inside diameter shall vary not more than ±1/64 in. from that specified in the case of ⅜ to ¾-in. hose, inclusive, nor more than ±1/32 in. from that specified for larger sizes."

Add a paragraph to the present Section 14 to read as follows:

"The letters and figures shall be ¼ in. high, shall stand 1/32 in. in relief, and shall be clear and distinct."

Section 16.—The procedure covering failure as outlined in this section is covered in Methods D 15-22 T. It is accordingly recommended that this section be changed from its present form: namely,

"(*a*) If the sample fails to meet the requirements of Section 9, the lot from which it was taken shall be rejected.

"(*b*) If the sample fails to meet the requirements of either section 10 or 11, two additional samples shall be tested. If either sample fails, the lot from which it was taken shall be rejected."

to read as follows:

"(*a*) Each length of hose that fails to meet any of the requirements of these specifications shall be rejected

"(*b*) In the case of failure to pass any one of the tests specified in Sections 9, 10, and 11, the entire lot of hose represented by the sample, or samples, subjected to these tests shall be rejected."

The committee recommends that the specifications as revised be continued as tentative.

Tentative Specifications for Braided Air Hose for Use with Pneumatic Tools (D 60-21 T).[1]—The following revisions are recommended in these specifications:

Section 6 (a).—Make the same change as in Section 6 (*a*) of Specifications D 46-21 T above.

Section 8.—Make the same change as in Section 8 of Specifications D 46-21 T above.

Section 9.—Change to read as follows by the addition of the italicized words and figures and the omission of the words and figures in brackets:

"(*a*) *In the case of hose 1 in. or less in diameter*, the test specimens shall be cut longitudinally from the samples of the hose; *in the case of hose over 1 in. in diameter, the test specimens shall be cut transversely.*

"(*b*) The tensile strength shall be not less than 800 lb. per sq. in. for the tube and [700] *1000* lb. per sq. in. for the cover.

"(*c*) The elongation at the breaking load [for both the tube and the cover] shall be such that the original 2-in. gage length of the test specimens shall stretch to not less than [10½ in.] *7 in. in the case of the tube and 9 in. in the case of the cover.*

"(*d*) The set, or permanent elongation, following a stretch from 2 in. to 5 in. in the case of the tube and from 2 in. to 7 in. in the case of the cover, shall not exceed 25 per cent."

Section 10.—Make the same change in Section 10 of Specification D 46-21 T above.

Section 11.—Change the first paragraph to read as follows by the addition of the italicized words and figures and the omission of the words and figures in brackets:

"From the [52-in.] *36-in.* sample described in Section 8, a piece of hose [3 ft.] *24 in.* long shall be taken and subjected to a hydrostatic test at the pressure specified in Table I, for hose of its size."

TABLE I

⅜	[950] *800*
7/16	[925] *800*
½	[900] *800*
⅝	[850] *800*
¾	[750] *800*
1	[700] *700*
1¼	[650] *650*
1¼	[600] *600*
1½	[550] *550*

Section 13 (a).—Change from its present form: namely,

"(*a*) The minimum wall thicknesses shall be 3/32 in. for the rubber tube and 1/16 in. for the rubber cover."

to read as follows:

"(*a*) The minimum thickness for the tube of ⅜ and 7/16 in. hose shall be 0.045 in., for ½ to ¾-in. hose, inclusive, the minimum thickness for the tube shall be 0.062 in., and for 1 to 1½-in. hose, inclusive, the minimum thickness of the tube shall be 0.094 in. The minimum thickness for the cover of ⅜ and 7/16-in. hose shall be 0.045 in.; for ½ to 1½-in. hose, inclusive, the minimum thickness of the cover shall be 0.062 in."

Section 14.—Insert a new Section 14 to read as follows, re-numbering the subsequent sections accordingly:

"*Tolerances.*—The inside diameter shall vary not more than ±1/32 in. from that specified in the case of ⅜ to ¾-in. hose, inclusive, nor more than ±1/16 in. from that specified for larger sizes."

Add a paragraph to the present Section 14 to read as follows:

"The letters and figures shall be ¼ in. high, shall stand 1/32 in. in relief, and shall be clear and distinct."

Section 16.—Make the same change as in Section 16 of Specifications D 46-21 T above.

The committee recommends that the specifications as revised be continued as tentative.

Tentative Specifications for Rubber Belting for Power Transmission (D 53-21 T)[2]—It is recommended that these specifications be revised as follows:

Section 10.—Add a new paragraph (*b*) to read as follows:

"(*b*) The adhesion between the plies shall be such that a weight of 20 lb. will not cause separation at a rate greater than 1 in. per minute."

Section 11.—Change the first sentence to read as follows by the addition of the italicized words and figures and the omission of the words and figures in brackets.

"A test specimen 20 in. in length and prepared as described in Section 9 shall have transverse reference lines marked upon it 10 in. apart and at equal distances from the ends; it shall then be tested in a tension testing machine and under a pull of 100 lb. per in. per ply, shall [not] stretch *not* more than [7] *9 per cent nor less than 5 per cent.*"

Section 21.—Insert a new Section 21 to read as follows, re-numbering the subsequent section accordingly:

"*Rejection.*—Any length of belting which fails to meet the requirements of these specifications shall be rejected."

Proposed New Tentative Standards

Proposed Tentative Specifications for Wrapped Cold Water Hose.—Proposed tentative specifications for wrapped cold water hose for other than fire department use are appended to this report and are recommended for publication as tentative.

Proposed Tentative Specifications for Rubber Matting for Use Around Electrical Apparatus or Circuits not Exceeding 3000 Volts to Ground.—Proposed tentative specifications for rubber matting for use around electrical apparatus to meet the requirements of the electrical industry as represented by the Accident Prevention Committee of the National Electric Light Association have been prepared and are appended to this report. It is recommended that they be published as a tentative.

Miscellaneous

The principal activity of importance aside from work in connection with specifications has been in connection with the general subject of performance tests for rubber products. A special committee is studying this problem with a view to determining the practicability of introducing into specifications for rubber products performance tests such, for example, as certain kinds of abrasion tests and the Geer accelerated aging test.

[*Wrapped Cold Water Hose and Rubber Matting Specifications will appear in our next issue.*]

[1] *Proceedings*, Am. Soc. Testing Mats., Vol. 21, p. 788 (1921).

[2] *Proceedings*, Am. Soc. Testing Mats., Vol. 21, p. 795 (1921).

Shoeing a Car with Low-Pressure Air

By J. E. Hale

Manager of the Development Department, *Firestone Tire & Rubber Co., Akron, Ohio.*

THE author describes the results of a deliberate attempt to make motor vehicles ride on air at a low pressure, through the usage of a air-cushion tire having greater carcass flexibility than is usual and by enlarging the size of the tire section so as to provide a greater area of contact between the tire and the pavement. The goal tried for was to increase the area of contact sufficiently so that air pressures ranging from 20 to 35 lb. per sq. in. could be employed in actual practice.

Fundamental conditions are considered first, followed by statements as to what advantages the air-cushion tires containing air at low pressure give to a car. The effects on car operation are presented at some length, inclusive of considerations regarding car speed, steering ability, front-wheel shimmy, traction, braking control, blow-outs, side-sway, and other factors of influence.

Durability and tire cost are treated in some detail and specific applications of air-cushion tires to automobiles are considered. In conclusion, recommendations are made for a new tire-size nomenclature, in regard to oversizing and to tire-deflection limitation; and specific tire-size recommendations for air-cushion tires on stated makes of car are advocated in the Appendix.

THERE are good reasons for believing that the automobile industry is on the threshold of the third great development in pneumatic-tire construction. The motor-car industry grew and expanded through its development years on square-woven fabric-tires of rather small cross-section. The art of building tires was new and our best constructions in those days were the small, stiff carcasses that naturally called for high air-pressures. Their shortcomings are too well remembered to need recalling, to say nothing of the range of sizes and the struggle for ascendancy between clinchers and straight-sides.

The employment of cord fabric in carcass construction was the second step in advance in pneumatic-tire structure. By virtue of this change in carcass construction together with the realization of the importance of more ample sections, tire mileages were increased greatly, with a corresponding reduction in cost. There was not only a mileage increase, but the tires were much more reliable and not subject to such exasperating failures. It is possible that, with the consummation of the improvements and changes under development at present, the third step is ready to be taken. In this move we will take advantage of the cord construction that has proved its durability and reliability, combine this with a much larger section and a thinner wall and make it possible to ride on low-pressure air for the protection of the car and the greater comfort of the passengers, without any sacrifice in economy.

Someone has facetiously said that Goldberg, the cartoonist,

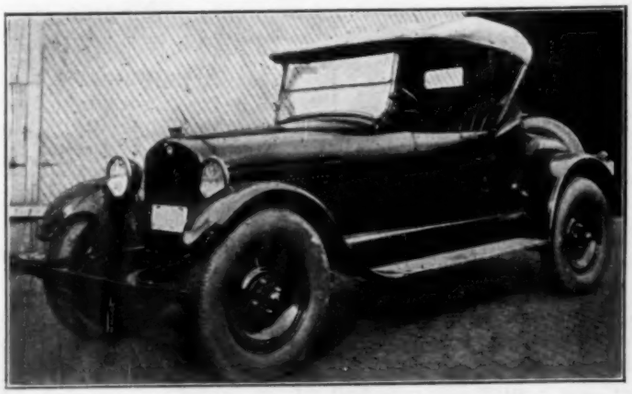


Fig. 1—*Passenger Car Equipped with Four-Ply Air-Cushion Tires*

in portraying doughnuts for wheels in his pictures, was the originator of the idea but, while he depicted large-section tires truly enough, the large section is not the whole story necessarily. On the other hand, of his own volition many an automobile owner has allowed his tires to be run under-inflated for his own personal comfort, explaining in a casual way that he did not intend to be shaken to pieces by the air pressures

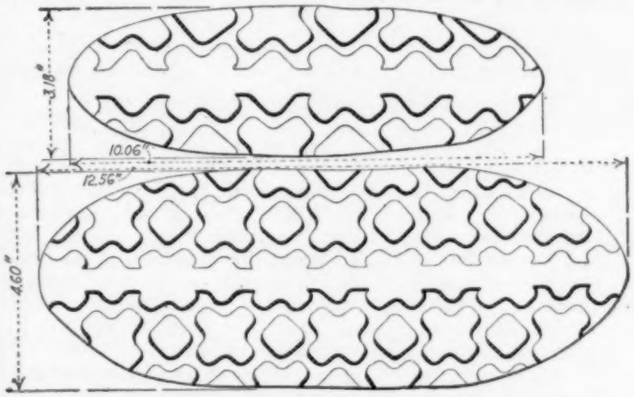


Fig. 2—*Comparison of the Tread Imprints of a* 7.30 *Air-Cushion Tire Having an Inflation-Pressure of* 35 *Lb. per Sq. In. and a* 33 x 5 *In. High-Pressure Pneumatic Tire Having an Inflation-Pressure of* 65 *Lb., Each Tire Having Been Loaded* 1700 *Lb.*

which the tire companies recommended, and that he was willing to sacrifice tire economy if necessary to secure this greater comfort; that is, he wanted to ride on low-pressure air. Also, a few cases are known of 6 or 7 in. thick-walled pneumatic truck-tires and truck rims having been applied to passenger cars and run at low pressure, notably by tire experimenters; this is, presumably, more in the nature of a stunt, since it does not appear that they had any serious thought of pushing the idea for actual commercial application to passenger cars.

This newest development, the air-cushion tire, is the result of a deliberate attempt to make riding on low-pressure air possible. It is the natural consequence of a strong conviction on my part that there ought to be a way to accomplish it that led the company I represent to take the bold step in going to an extreme and providing carcass flexibility and a section size sufficient to give the tire a larger area of contact with the pavement. Fig. 1 shows my car as it appeared when equipped with the original set of these tires in October, 1922; they were constructed with four plies of cord fabric, molded to 7¼ in. section, had a 20 in. wheel diameter and were inflated to a pressure of 18 lb. per sq. in.

Fundamentals Considered

The fundamentals of this movement are comparatively

*As published in Journal of S.A.E. July, 1923. Paper originally presented at recent S.A.E. Meeting at Spring Lake, N. J.

simple. If we are to have greater cushioning for comfort and protection against vibrations of the car, the combination of a low air-pressure and a large area of contact must be provided, and by employing such tire constructions that the tire durability will not be impaired. The goal aimed at was to increase the area of contact sufficiently so that air pressures ranging from 20 to 35 lb. per sq. in. could be employed in actual practice.

In a general way, the contact area of the tread with the road, expressed in square inches, multiplied by the internal air-pressure will give a figure that approximates the load resting on the tire. This is as it should be. It is evident that

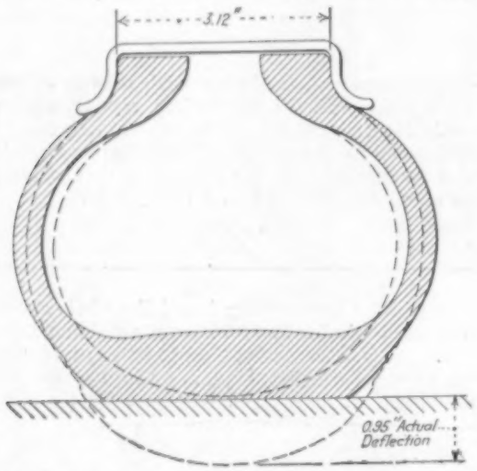


Fig. 3—Vertical Deflection of a 33 x 5 In. Air-Cushion Tire when Loaded to 1700 Lb. and 80 Lb. Air

if a 1000 lb. load is to be imposed on the tire, and due to the limitation in the amount of vertical deflection not more than 20 sq. in. of contact can be obtained, it will require a 50 lb. per sq. in. pressure of air to carry the load. If, however, we can devise some way of increasing the area and still not exceed the proper degree of deflection; for instance, if we can increase the area to 50 sq. in., it will require very much less pressure; in this case a pressure of only 20 lb. per sq. in. is needed to carry the same load. Fig. 2 shows the tread imprint of a 7.30 in. air-cushion tire compared with that of the 33 x 5 in. high-pressure pneumatic-tire, each tire having been loaded to 1700 lb.; but with an air pressure of 35 lb. per sq. in. in the air-cushion tire and 65 lb. per sq. in. in the 33 x 5 in. tire. The vertical deflection of these two tires is shown in Figs. 3 and 4, which are drawn to the same scale to enable one to visualize the cross-sectional difference.

TABLE 1—HIGH-PRESSURE PNEUMATIC CORD-TIRES FOR PASSENGER CARS AND MOTOR TRUCKS

Size, In. Nominal	Size, In. Actual	Number of Plies	Maximum Load, Lb.	Maximum Permissible Deflection, Actual, In.	Maximum Permissible Deflection, Per Cent	Road Contact, Area, Sq. In.	Road Contact, Length, In.
Passenger-Car Tires							
3½	3.51	4	650	0.68	19.4	10.9	7.20
	3.70		700	0.83	22.4	11.8	7.85
4	4.40	6	1,000	0.81	18.4	17.0	8.90
4½	4.95	6	1,250	0.90	18.1	21.4	9.45
5	5.80	8	1,700	0.95	16.3	26.3	10.00
Pneumatic Truck-Tires							
6	6.60	8	2,200	0.86	13.0	36.7	9.00
7	7.70	10	3,000	0.92	12.0	45.8	9.60
8	8.80	12	4,000	0.97	11.0	54.4	10.08
9	9.90	14	5,000	0.99	10.0	67.0	11.20
10	11.00	16	6,000	1.10	10.0	79.5	10.35

One of the fundamental conditions of conservative tire use that we recognize is the limitation of the actual vertical deflection of the tire expressed as a percentage relation of the sectional diameter. It has been found that if this percentage of deflection is exceeded, the tires are likely to fail prematurely from two causes: First, tread separation and ply separation are likely to be excessive; second, the flexing localizes half-way up the side-wall and may cause fabric failure on the inside plies. It can be appreciated readily that, in the case of a thick-walled tire, the destructive effect of this flexing will be much more pronounced than in the case of a thin-walled

TABLE 2—AIR-CUSHION TIRES FOR PASSENGER CARS

Size, In. Nominal	Size, In. Actual	Number of Plies	Maximum Load, Lb.	Maximum Permissible Deflection, Actual, In.	Maximum Permissible Deflection, Per Cent	Road Contact, Area, Sq. In.	Road Contact, Length, In.
4.40	4.40	2 or 4	750	1.01	23	20.2	8.90
5.25	5.25	4	1,000	1.21	23	28.5	9.93
6.20	6.20	4 or 6	1,300	1.42	23	36.7	10.70
7.30	7.30	4 or 6	1,700	1.68	23	48.3	12.50

tire. But, if we use low-pressure air, the bursting stresses on the carcass are low enough so that only a few plies are necessary and this, in turn, makes it possible to increase the deflection percentage. Table 1 lists the percentage deflection limitations of high-pressure pneumatics; also, other fundamentals for comparisons to be referred to later.

Our tentative air-cushion-tire schedule offers four section sizes for passenger-car use, each size to be made of no more than six plies, constructed so as to permit their normal use with pressures between 20 and 35 lb. per sq. in. and to be used on rims the width of which is approximately 45 per cent of the tire section. Table 2 shows figures comparative to those of the high-pressure pneumatic-tire.

What Air-Cushion Tires Do For a Car

As to the effect that these tires have on the riding of the car, the first reaction to the occupants is the greater degree of comfort. Road-surface irregularities are toned-down and, in most cases, obliterated. Of course, the "ups-and-downs" in the road are still there and the car goes up and down with them, but everything is cushioned so that there are no sharp shocks or jolts; one does not need to watch the road to put his body in tense condition to get over the rough places, nor to be worried about being tossed up from the seat. Furthermore, the driver does not need to pick out all the good places in a rough road, because it makes little or no difference whether he takes them in or not.

It is remarkable how a car equipped with 7.30 in. tires will negotiate a frozen road. As an extreme example, I have seen a certain car driven over the ties on a railroad track with little discomfort to the occupants. Of extreme convenience is the fact that, in suburban driving where it is necessary to go off the pavement, one does not need to take any special precaution to slacken the speed, because the average rough road

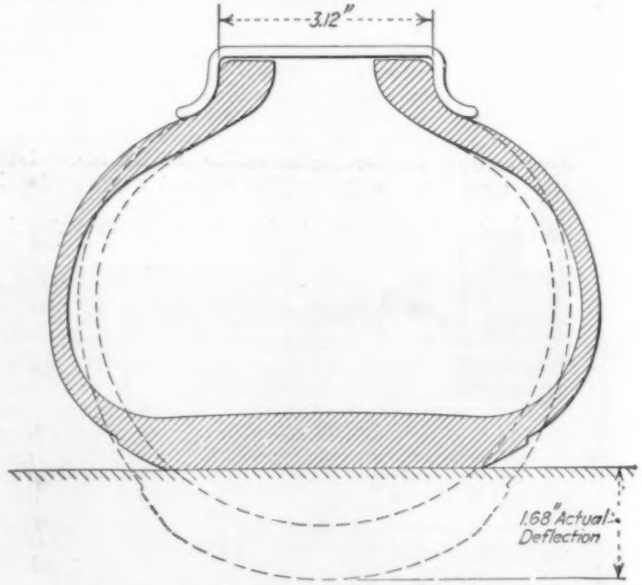


Fig. 4—Vertical Deflection of a 7.30 In. High-Pressure Pneumatic Tire when Loaded to 1700 Lb. and 35 Lb. Air

usually can be taken at the same speed as that used on the pavement. Another important factor is that, on rough roads, particularly in the country, the air-cushion tires smooth-out the road so that a substantially higher average speed is practicable.

Of equal importance to improving the degree of comfort is the effect on the mechanism and the body of the car itself.

So far, no way has presented itself of making deliberate comparisons of the effect of low-pressure air in preserving the car from developing rattles, creaks and mechanical depreciation, but there is no question about its being a tremendous factor; this is due to the fact that everything is cushioned. Compared with high-pressure pneumatics, the sharpness of shocks is softened very effectively. For example, one of our new test-cars has been running on 6.20 in. air-cushion tires with about 20 to 25 lb. per sq. in. air pressure; for the purpose of comparison, 4 in. regular pneumatic-tires with the proper inflation air-pressure of 50 lb. per sq. in. were substituted. As a result of this, rattles appeared that the test-car driver had never observed before; in fact, with air-cushion equipment, he said there were no rattles, a noticeable contrast when considering the same car on regular high-pressure pneumatics.

Since there are no satisfactory instruments for measuring the cushioning qualities of air-cushion tires, I have resorted to a series of pictures, Figs. 5 to 9, which were taken to make it possible to visualize how the air-cushion tires function. Manifestly, a thin-walled tire having very low air-pressure and large cross-section, with a big area of contact, will roll over and envelop any projections with much less tendency to elevate the axle than will a tire having a thick carcass with half the area of contact and high air-pressure. Figs. 5 to 7 show very vividly to what an extraordinary degree the bricks, rails, and the like are absorbed into the tires.

Regarding ridges and holes in the road which must be negotiated, the tire, the wheel and the axle must be lowered or elevated bodily, as the case may be and, particularly, in the case of a sharp drop as into a chuck-hole. These cases are among the most aggravating of any that we encounter. In the case of dropping into a chuck-hole, the air-cushion tires, having a much greater permissible actual deflection in falling through the distance, are brought to rest more gradually; in fact, they are brought to rest so gradually that the effect is more of a rolling action.

Believing that the use of ultra-rapid motion-picture photography might throw some light on the fuctioning of air-cushion tires compared with high-pressure pneumatic-tires, we had some motion pictures taken while the cars were operating over a typical road-surface. These pictures show some interesting things; particularly, they enable one to visualize in a strictly comparative way the superior cushioning of the air-cushion tires.

Effects on Car Operation

There seems to be a definite list of questions that arise in the minds of the car designers and the public regarding the

Fig. 5—A 7.30 Air-Cushion Tire with an Inflation-Pressure of 18 Lb. Absorbing the Inequality in the Road Surface Due to Heaved-Up Brick

application of air-cushion tires and their effects on car operation. Naturally, we have taken all these questions very seriously because it manifestly would be unwise to proceed with any development work on a line of tires that has no prospect of being commercially applicable. I believe we have reasonable answers for all of the practical operating aspects that arise.

Of questions on the various phases of practical car-operation, probably the most frequent is in regard to fuel consumption. In general, the air-cushion tires cause neither more nor less fuel to be consumed than do the high-pressure pneumatics. On actual fuel-consumption, a number of private owners have found that, by keeping account of the fuel used, they noticed a slightly greater mileage per gallon with air-cushion tires. Our most authoritative information, however, is derived from our observations on six taxicabs that ran a total of 20,000 miles during April, 1923, on 7.30 in. air-cushion tires; the fuel consumption averaged 13.5 miles per

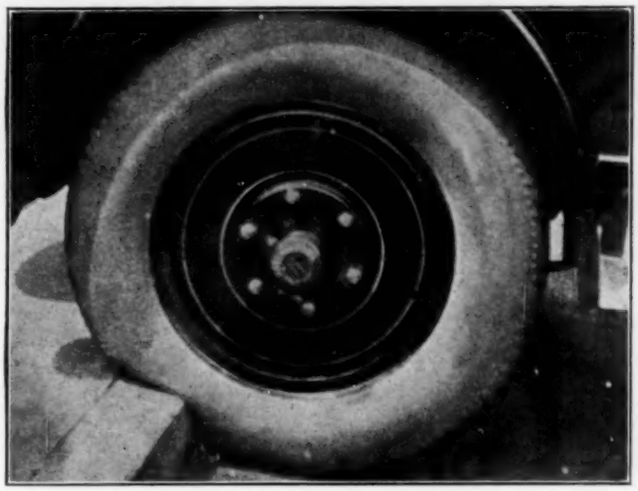


Fig. 6—How Air-Cushion Tires React against the Curb

gal. This compares with a fuel consumption of 12.6 miles per gal. for a larger number of similar cabs that covered many times that amount of mileage on 33 x 4½ in. six-ply tires having an air pressure of 70 lb. per sq. in.

From the viewpoint of fuel economy, so far as tire technique is concerned, it appears that, in the case of the regular pneumatic tires with a smaller tread-contact, it is the internal carcass-friction rather than the tread rolling-resistance that absorbs energy. On the other hand, in the case of the air-cushion tires, the carcass being so thin as to have practically negligible carcass friction, the large area of contact occasions a much greater degree of road friction than in the case of the regular pneumatic tires, and it is probable that these effects would just about balance each other in the two classes of tire. With air-cushion tires, the cars coast just as freely and accelerate practically in the same degree as with high-pressure pneumatic-tires.

Fig. 8 shows the acceleration and coasting observations made on a car equipped alternately with 7.30 in. air-cushion tires having an air pressure of 25 to 28 lb. per sq. in. and with 33 x 4½ in. tires having an air pressure of 50 to 55 lb. per sq. in. The comparative tests were made without disturbing the brakes or bearing adjustments, since the wheel changes were made simply by switching disc wheels that are demountable at the hub.

Effects on Speed and Steering

The question has been raised as to whether, with air-cushion tires, the top speed will be cut down; that is, speeds of 60 m.p.h. and upward. While the evidence is not positive, the indications are that there may be a slight difference. Very likely, any appreciable slackening of these higher speeds can be attributed to the windage resistance of the tire. Unquestionably, tires with such large section covered with non-skid projections would make this a notable factor.

The question next frequently raised is in regard to how the steering is affected. This is perfectly natural, because most drivers have discovered that, when the front tires are soft, there is a slightly increased resistance to steering. From

laboratory tests, we have found the area of contact of the air-cushion tires with the road surface to be about twice that of the high-pressure pneumatic tires, and under these conditions one can detect a slight difference in turning the wheel. In ordinary driving this effect is of such minor consequence that it cannot be considered a serious handicap. However, we find that, when the car is in close quarters, such as being parked by a curb, it is more difficult to pull the wheels around when the car has little or no headway.

In some cases the larger tires actually favor the steering. For instance, on streets having trolley-lines, the front wheels are not deflected at all in making a cross-over from one side of the street to the other, even though the angle at which the car makes the crossing over the rails be the next thing to parallel driving. Another favorable feature is that, when dropping into chuck-holes or off the edge of the pavement, the reaction tending to deflect the car is much less pronounced. In fact, in the latter case, the control is infinitely better in regaining the pavement. It seems to me very probable that as car designers study the problem of fitting air-cushion tires to their different models, changes in steering-gear may be entirely plausible to compensate for any minor effects introduced by the tires.

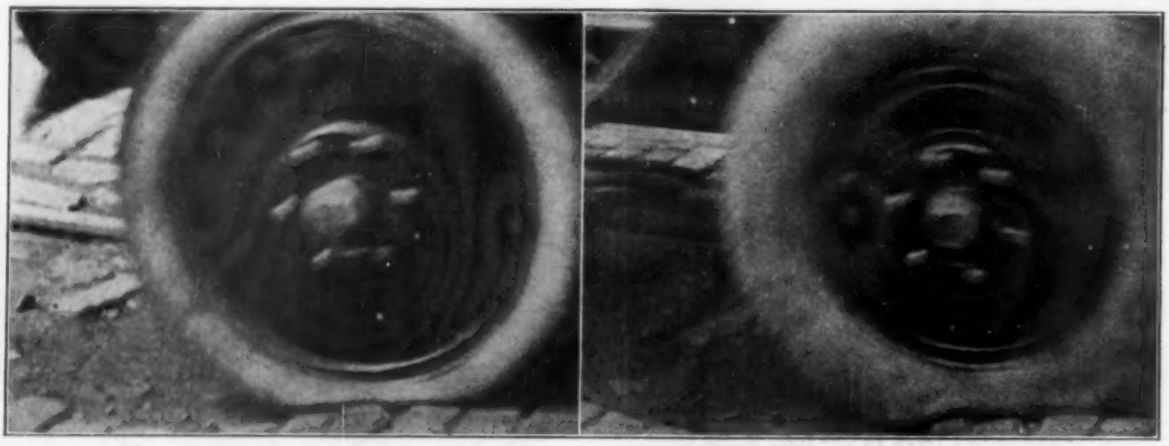


Fig. 7—Comparative Actions of a High-Pressure Pneumatic Tire (at the Left) and an Air-Cushion Tire (at the Right) Rolling Out of the Same Chuck-Hole

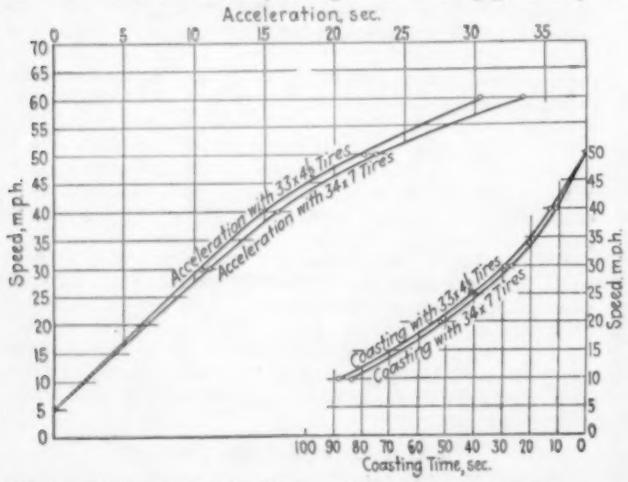

Acceleration, sec.
0 5 10 15 20 25 30 35
70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
Speed, m.p.h.
Acceleration with 33x4½ Tires
Acceleration with 34x7 Tires
Coasting with 33x4½ Tires
Coasting with 34x7 Tires
50 45 40 35 30 25 20 15 10 5 0
Speed m.p.h.
100 90 80 70 60 50 40 30 20 10 0
Coasting Time, sec.

Fig. 8—Results of Acceleration and Coasting Tests Made on a Passenger Car Equipped Alternately with 34 x 7 In. (Size 7.30) Air-Cushion Tires Having Inflation-Pressures of from 25 to 28 Lb. per Sq. In. and 33 x 4 1/2 In. Pneumatic Tires Having an Inflation Pressure of from 50 to 55 Lb. Per Sq. In.

A reference to the steering-gear brings to mind our unsolved mystery, the front-wheel shimmy. This has been observed and commented upon by certain car engineers in connection with the application of air-cushion tires. Just how far we should go in assigning the cause of this front-wheel shimmy to the application of the large-section low-pressure tires is not clear. I have encountered some cases of front-wheel shimmy on both high-pressure and low-pressure pneumatic tires and, in each case, the trouble has been taken care of by such methods of adjustment and replacing of the parts as the ordinary repair-shop has at its command. However, judging from the prominence that the subject of front-wheel shimmy has been given from a design point of view, it is not unlikely that the low air-pressure may be a factor that will justify the industry in considering it a joint problem for the tire and the car engineers to solve.

Traction and Braking Control

The traction and braking control of the car in driving is probably of equal importance with the fuel consumption and the ease of steering. I have not found any way to make comparative measurements of this effect, but can report my own experience which checks with that of every other user of the properly designed air-cushion tires. On wet pavements, with the brakes equalized properly, I have tried every way that I could think of to make my car skid but, so far, the only thing which happens is that the car stops. In the most ticklish traffic I have no fear about what I can do in an emergency. The large area of contact, with the greatly increased linear total of non-skid edges that gives a squeegee effect, undoubtedly is the combination that gives such excellent non-skid results.

TABLE 3—DISTANCE THE WHEEL DROPS WHEN THE TIRE BECOMES INFLATED

Air-Cushion Tires		Pneumatic Tires	
Size, In.	Wheel Drop, In.	Size, In.	Wheel Drop, In.
4.40	2 3/8	3½ (Clincher)	1 7/8
5.25	2 15/16	4	2 3/8
6.20	3 3/8	4½	2 7/8
7.30	4 3/4	5	3 7/8

In contrast to wood block or asphalt are cases of uneven pavement surfaces where the actual area and the button-edge contact is cut down by the road-surface irregularities. In the case of the air-cushion tires, the area is so large and the carcass is so flexible that it folds and rolls over the dips and hollows in the road surface so as to maintain a uniformly large area of contact at all times. This is not true in the case of the high-pressure tires, which are inflated so hard that they lose a great amount of their contact; the result is that the air-cushion tires hold much better on rough pavements. On snow and ice, the control of the car with air-cushion tires is noticeably better than with high-pressure pneumatic tires. This is true particularly in eliminating the tendency to skid sidewise in applying the brakes and rounding corners. In applying the brakes for a quick stop, one has to be very cautious lest the wheels become locked and, should this happen, the result is much the same as with the regular pneumatic tires.

Since front-wheel brakes are being considered so seriously by designers, I think they will do well to investigate thoroughly the capacity of air-cushion tires to control the car. From this point of view, it may be that this new type of tire offers sufficient improvement in braking control to obviate the necessity for front-wheel brakes.

Tire Blow-Outs

The question of danger from a flat tire has come up. If one were driving at 40 to 45 m.p.h. and had a blow-out on the right front tire, what would happen? We are not in a position to make any very positive assertions on this point, as only two blow-outs have occurred in all our testing experience. These occurred on a test car when the car was traveling about 30 m.p.h.; the test-car driver states that it did not in any way cause him to lose control of the car or cause it to display any tendency to become unmanageable. We tried the experiment of producing a flat tire on the right front-wheel of a test car having 7.30 in. air-cushion tires. Starting inflated, but with the inner-tube valve-insides backed-out to deflate the tire rapidly, we ran along at between 35 to 40 m.p.h. for a considerable distance after the tire was entirely deflated. We found it was necessary for the observer to step out on the running-board and actually look at the tire to be sure that it had become fully deflated; the driver found that he could take his hands off of the steering-wheel without producing any tendency to give trouble. This brings up the question of how great the drop is when the tire becomes deflated. Table 3 gives the figures showing the difference between the condition of full inflation and that of a flat tire.

Side-Sway

Some people are apprehensive lest the side-sway be objectionable. This, in my opinion, is a point of view. I presume that a little more side-sway can be detected and measured with the air-cushion tires than with the high-pressure pneumatic tires; but it is my observation that, after becoming accustomed to the car, all thought about this feature disappears from the mind.

Centrifugal force deforms the cross-section of the tire, changing it from a substantially circular to an elliptical shape. The standing diameter is increased and the section diameter is diminished. The figures given in Fig. 11 were obtained simply by revolving the tire on a shaft and measuring with an indicator that was arranged to roll against the tread.

Another feature of control in driving is the new attitude on the part of the driver toward the roadway ahead of him, particularly if he does much driving after dark. He soon finds that whereas formerly he slowed-down or steered for the smoothest places in the street as a matter of course, this is not necessary with air-cushion tires. Of course, the very worst chuck-holes might be avoided, but the driver soon learns

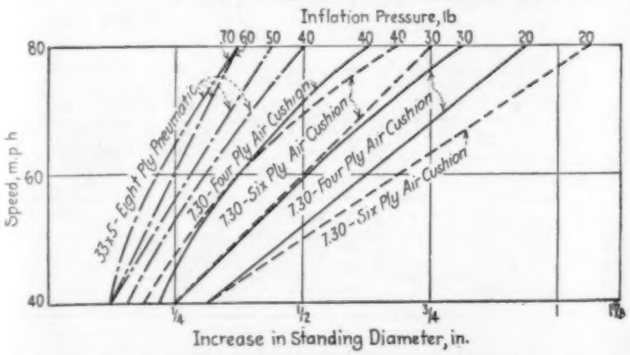


Fig. 9—Curves Showing the Increase in Standing Diameters of Different Tires Due to Centrifugal Force

that he need not slow-up for rough spots, as he can take them without slackening speed.

While it is apparent that the car can be driven much faster over the average highways as we find them with almost complete elimination of vibration, I am wondering whether this higher average speed may not lead to more or less serious consequences from another source. Will the powerplant and the transmission system withstand this higher average speed without suffering damage? Naturally, the conclusions on this point will need to be drawn by those skilled in observing such things and particularly by making direct comparisons with tires on the old equipment. It is my opinion that the increased speed will amount to somewhere between 10 and 30 per cent.

Galloping and Front-Wheel Toe-In

For some reason that is not very clear to me, cars equipped with air-cushion tires develop a violent galloping when they are not equipped with shock-absorbers. This is so noticeable that I can predict disappointment to any one equipping a

Fig. 10—One of the Four-Ply 7.30 Test-Tires that Failed after Having Worn Through the Breaker and Three of the Plies

car without the use of shock-absorbers. Possibly spring designers can furnish some explanation for this situation.

At present, it appears that the amount of gather or toe-in on the front wheels will have to be adjusted very delicately to prevent the excessive wear that appears with improper alignment. Our observations point clearly to the fact that air-cushion tires are more sensitive to improper alignment than are the high-pressure pneumatic tires.

Two features of car operation that register against air-cushion tires are their mud-splashing and dust-raising propensities. The larger-section tires with the greater area of contact spatter mud much more than any other tires heretofore brought out and, as for dust-raising on country roads, it is terrible. I believe that a motor-truck convoy could not raise more dust in traveling along a dry country road in summer than my own car raises. While this may be a minor point, it may develop into an objection.

Durability and Tire Cost

All our development work on air-cushion tires has been carried out under actual road-test conditions. To date, we have run a total of 850,000 tire-miles under test observations, and evidence points to average mileages at least as high as those enjoyed with regular pneumatic tires. The character of the failures unquestionably will be somewhat different. For instance, ply separation and tread separation will be minimized in air-cushion tires and, with these eliminated, the

most prominent troubles will be fabric breaks in the carcass; also, punctures and rapid tread-wear on the front wheels when they are not aligned properly. Many people have questioned whether, with such a thin tire, punctures will not be sufficiently numerous to be of considerable annoyance. There are no grounds for concern on this score. In 50,000 car-miles of operation of our test fleet there were seven punctures, and in 100,000 miles of operation in taxicab service there was an average of one puncture for each 3700 taxicab-miles. The explanation is found in the fact that the tire, being not so taut and hard and drum-like, yields rather than becomes pierced by the puncturing object.

The light carcass-structure necessary in these tires also raises the question as to whether they have the stamina to withstand the rough usage to which the heavier cars are often put. A large measure of our road-testing development was on tires of the four-ply construction. Their performance under test conditions is repeatedly showing great ruggedness. One of these four-ply 7.30 in. test-tires gave out after having worn through the breaker and three of the four plies, as shown in Fig. 10. The interesting point is that it continued to run on this single ply for a considerable distance before finally blowing-out by bursting open at this point, as can be seen clearly in Fig. 10. When one considers that this was on the front wheel of one of our heaviest cars, which was touring in the South, it emphasizes the part that low inflation-pressure plays in making the casing so soft and yielding that the destructive reaction of ordinary driving largely is eliminated. In other words, no part of the tire is subject to high intensity of stress at any one point, which is contrary to the condition that applies to the high-pressure pneumatic tires. There is no doubt that this lessened intensity of pressure is responsible for the almost complete absence of tread and ply separation. By dwelling on Figs. 5 to 7, showing the tires rolling over obstructions in the road, one can more or less sense that the tire, instead of resisting the blow that the road gives, yields with no destructive effect. For instance, one interesting point is the fact that air-cushion tires run their life with no tread-cuts whatever. I have seen many tires that have covered more than 7500 miles which were so free from tread-cuts that, had they been washed-up, they could be taken for new. The same thing applies to the side-wall of the tire; that is, in running in ruts or against curbs or loose rocks in the road, an ordinary pneumatic tire is apt to have the side-wall scraped or abraded. With air-cushion tires, however, the tire yields to the blow, thereby protecting itself and escaping injury.

Misalignment of the front wheels manifests itself very quickly by rapid tread-wear. In the few cases that we have observed, however, we have had no trouble in eliminating this by prompt attention to the realignment.

With long tire life, protection of the car against destructive vibration effects and favorable fuel-consumption, I believe the cost of car operation will be lower. At present, it is not possible to give any comparative tire costs because we have not had an opportunity to get volume production figures. The manufacturing details will be sufficiently different from those of regular pneumatic tires to have a slight influence tending to increase the tire cost.

Other factors that have a larger influence on the cost element than the manufacturing processes are the section size of the tire and the number of plies to be used. Comments are made and comparisons are drawn on section measurements and the number of plies, later in the paper. In a general way, as a result of our development work, I have concluded that the amount of cotton and rubber used in air-cushion tires need not be much greater, if any, than that in the tires which they replace. Therefore, if we increase the section, we can make a corresponding decrease in the thickness of the walls of the tire. However, until the actual sectional sizes to be put on the market are decided upon, it is not expedient to attempt to forecast precise cost figures.

TABLE 4—WEIGHTS AND STANDING DIAMETERS OF TIRES

Air-Cushion Tires							Pneumatic Tires					
		Weights, Lb.						Weights, Lb.				
Size, In.	Number of Plies	Tire	Tube	Demountable Rim	Total	Standing Diameter, In.	Size, In.	Tire	Tube	Demountable Rim	Total	Standing Diameter, In. High and Low Values of Tires on the Market
4.40	2	13.3	2.7	11.4	27.4	29½	30x3½[a]	11.9	1.8	12.0[b]	25.7	30⅝ to 31⅝
							Oversize Clincher Cord	14.0	2.1	12.0[b]	28.1	
4.40	4	14.5	2.7	11.4	28.6		Straight-Sided Cord	14.1	2.1	15.5	31.7	
5.25	4	21.1	4.0	12.8	37.9	31¼	31x4	21.3	2.7	16.8	40.8	32⅛ to 33
							32x4	21.7	2.8	17.4	41.9	32½ to 34
							33x4	22.7	2.9	18.0	43.7	34⅝[c]
6.20	4	27.2	4.8	14.8	46.8	33¼	29x4½	22.8	3.1	18.8	44.7	30½[c]
							32x4½	25.6	3.4	21.6	50.6	33⅛ to 34⅛
6.20	6	31.7	4.8	14.8	51.3		33x4½	25.9	3.5	22.5	46.8	34¼ to 35
							34x4½	27.4	3.6	23.5	54.5	35⅛ to 36⅛
7.30	4	34.3	5.2	18.8	58.3	35¼	30x5	29.3	4.0	18.8	52.1	32[c]
							33x5	37.2	4.6	21.6	63.4	34⅝ to 36
7.30	6	38.8	5.2	18.8	62.8		35x5	39.4	4.9	23.5	67.8	36½ to 37½

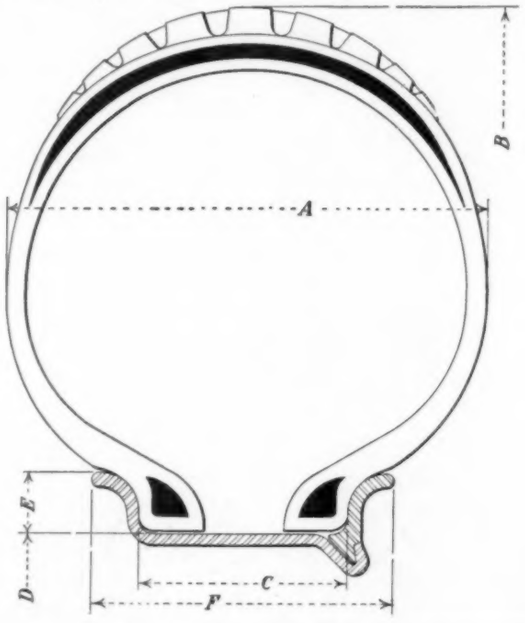
(a) Regular clincher cord
(b) Clincher rim
(c) Firestone

Low-Pressure Tires Applied to Automobiles

The foregoing covers our research development-work on the fundamental air-cushion idea. The result of all these activities since early in the fall of 1922 has been to confirm our judgment that we are working on a sound basis. The next logical move is to translate the low-pressure principles into practical application to motor cars, with the aid of the motor-car engineers.

To provoke discussion and draw forth constructive criticism, I know of no better way than to propose what appears to me to be an ideal line-up of tires and rims. This was suggested earlier in the paper and is now presented more in detail in Fig. 11, which shows an outline drawing of a tire and a rim and gives the principal dimensions. The 4.40 in. air cushion tires of either two or four plies on a 3 in straight-side rim is proposed for cars having approximately a 100 in. wheelbase that now use 3½ in. pneumatic tires. The 5.25 in. size using four plies on a 3½ in. rim is intended as a substitute for 4 in. regular pneumatic tires on cars that have wheelbases ranging from 109 to 115 in. The 6.20 in. size using either four or six plies on a 4 in. rim is designed to serve in place of some of the 4 in. and most of the 4½ in. regular pneumatic tires on cars that have wheelbases ranging from 118 to 126 in. The 7.30 in. air-cushion tire using four or six plies on a 4½ in. rim is offered to serve in place of a few 4½ in. and all 5 in. regular pneumatic tires as applied to cars having a 130 in., or longer, wheelbase. Each one of these four sizes has been fitted to a job in the group for which they are recommended, and it is our thought to receive comments on how successful we have been in working up this specific proposal.

In submitting this proposal, which is based on our experience in road tests combined with experimental applications to motor cars, we believe that, when finally worked out to



	Principal Dimensions							
Nominal Size	Actual-Tire Section A	Overall Diameter B	Rim Width C	Rim Diameter D	Flange Height E	Overall Width of Rim F	Ratio of C/A, per cent	Rim-Size Old Design
4.40	4.40	29½	2.00	20	0.59	3.06	45+	26×3
5.25	5.25	31¼	2.31	20	0.69	3.43	44+	27×3½
6.20	6.20	33¼	2.68	20	0.78	3.89	43+	28×4
7.30	7.30	35¼	3.12	20	0.87	4.38	43-	29×4½

Fig. 11—Tentative Proposal of Air-Cushion Tire and Rim Sizes for Passenger Cars

the state where it is suitable for commercial use, air-pressure recommendations ranging from 20 to 35 lb. per sq. in. will be satisfactory. Also, our tests have shown that the 45 per cent ratio of rim width to tire section as a basis of tire design, while being somewhat of a radical departure from the 10 to 12-year-old criterion of 66 per cent, is practicable so far as tire performance is concerned, has the exceptionally meritorious advantage of making a substantial reduction in the unsprung weight and, finally, is the most efficient combination of the number of plies and tire section to result in tire costs that will not be burdensome to the industry.

It seems to me that the car designers must view this problem from two aspects: first, whether there is anything inherent in the application of such tires to the car that makes them undesirable; second, the specific changes in the body, the

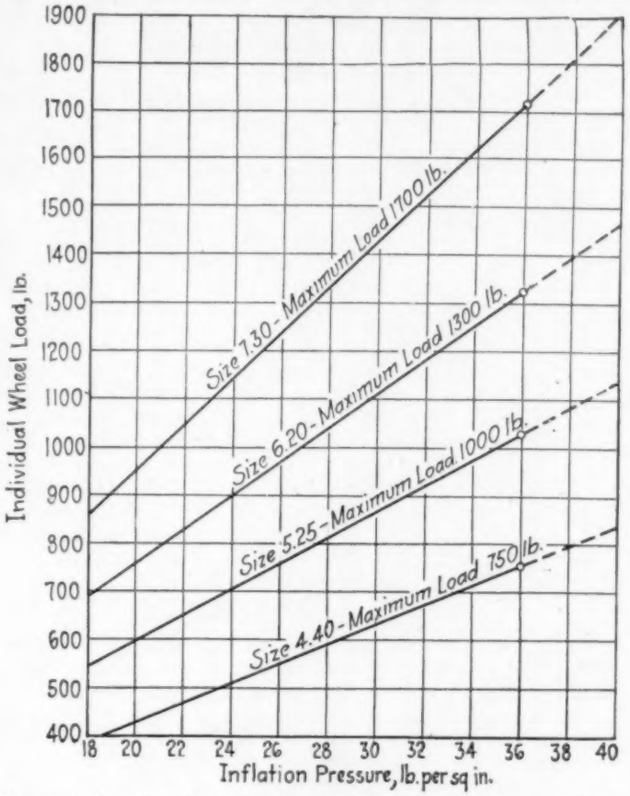


Fig. 12—Curves Showing the Inflation-Pressure Required to Support a Given Wheel-Load

axles, the fenders and the other features of car design that the designer would need to undertake to accommodate some changes in physical measurements.

Dwelling for the moment on the fundamentals underlying this movement, I ask: Does the motor-car industry wish to go as far as this proposal? Does the industry wish to have narrower rims and a light carcass-structure in the tire, or would it rather go to some half-way point? For instance, whereas I propose a 7.30 in. four or six-ply tire on a 4½ in. rim for cars having a 130 in. wheelbase, would it be along a line of less resistance and more appeal to the car builders to use a smaller section, say a 6 in. six-ply tire on a 5 in. rim, or would the 7.30 in. section tire be suitable if it were on a wider rim; and so on down the list of sizes? Bearing in mind always that this ideal line-up employs the rim of lightest weight, the lowest air-pressure and the least costly tire construction, how should we modify the proposal?

To take advantage of low-pressure air, a large area of contact is necessary and a large area of contact cannot be had without a high percentage of deflection; this, in turn, calls for a thin carcass and a large section. What are the problems of practical application that the car designer must recognize and master? Are they fundamental and far-reaching, or are they merely clearance and gear-ratio alterations?

Changes in fender, body and brake-drum clearances and also changes in the width of tread of the car, in fitting air-cushion tires, bring up a very complex situation. But it must be accepted as a foregone conclusion that any change in tire equipment that results in the use of larger sections and

smaller rim-diameters is very likely to bring about interferences and changed relations of the parts, which must be provided for. It is hoped that the automobile industry will not requisition more than one standing diameter for each section. The tire manufacturers have always been dreaming of the time when they would not need to make a series of standing diameters for each section and, whatever the final disposition of this matter may be, I bespeak for the tire industry a serious attempt to carry out some such program.

Table 4 gives weights of tires, tubes and two-piece rims such as are used for disc or wire wheels, and with the standing diameters of the tires to furnish a direct comparison of the air-cushion with the pneumatic tires.

Tire-Size Nomenclature

Reverting to the schedule as proposed, it will be noted that a new size-nomenclature is included. It has always seemed to me that the sizes of the tires are so far-fetched that I could not resist the temptation to propose a new disposition of this matter. I think everybody is aware that a 34 x 7 in. tire, for instance, has no part of the tire that measures 34 in. and, likewise, no part of the tire that measures 7 in. I propose that, when we finally work into air-cushion tires, the true section-size be used as the name size. It does not strike me as necessary to give a standing diameter, since there will be only one standing diameter for each section.

It is my belief that in introducing the air-cushion tire, the industry should start with the firm determination to make oversizing unnecessary and even that it should not provide for it. Years ago, two factors made oversizing a very desirable thing. I refer to our positive lack of knowledge of how to make good tires in the early days, and to the fact that car builders did not appreciate the desirability of ample sections. That day has long since passed and, at present, the instances in which the owner needs to put on an oversize tire are extremely rare. I wish we might say the same thing about pneumatic equipment for motor trucks!

Limitation of Tire Deflection

Earlier in the paper, I pointed out that the limitation of the load and inflation combination of any pneumatic tire is the percentage of deflection, and I gave a schedule of the figures conventionally in use today. I propose that the deflection of the air-cushion tires be limited to approximately 23 per cent of their section diameter. Having decided on this, it is a very simple matter to decide on the load and the inflation-pressure schedule by weighing the loads that the 23 per cent deflection will carry per each pound of inflation. This is set forth in graphic form in Fig. 12; I propose this as a load and inflation-pressure schedule. In applying it in practice, I believe it unwise only to publish the graph along with the price-lists and try to translate it into a table of load and inflation pressures as has been done in the past. It seems to me that the only logical thing to do is for each car builder to weigh the front and the rear of each of his models with full-passenger load. With the tire equipment decided, check off the proper inflation for each end of the car, stamp it on a small plate and attach it to the car in some conspicuous place so that the car-owner can feel that this subject has been given consideration by the car builder and that he has the builder's best judgment as a guide to what he should do. It is my judgment that air-cushion tires should be inflated very carefully and should check to within 1 lb. of the correct pressure. A typical example, one for each size of tire, and the disposition of the air-pressure problem, appear in the Appendix.

Appendix

As a basis for stating recommendations, a Ford car on 4.40 in., a Buick-Four on 5.25 in., a Jordan on 6.20 in. and a Lincoln on 7.30 in. air-cushion tires were picked out as typical examples to show our method of distinguishing between the different models and also between the front and rear of each model in regard to the amount of air pressure. The range of pressures used on any one make of car must necessarily be given greater attention than heretofore if we are to enjoy the best effect in the use of air-cushion tires. Of course, all makes of car have been treated similarly and the detailed information is available for each maker. The recommendations for the foregoing makes of car are stated in Table 5.

TABLE 5—RECOMMENDATIONS FOR AIR-CUSHION TIRE-EQUIPMENT AND AIR PRESSURES

Data obtained from the Tire & Rim Association, May, 1923						Recommendations for Ford Car		
						Air-Cushion-Tire Recommendations		
Model No.	Wheel Base, In.	Number of Passengers	Type of Body	Weight Ready for Road with Full Passenger Load, Lb.		Size, In.	Air Pressure, Lb. per Sq. In.	
				Front	Rear		Front	Rear
.....	.....	.....	Touring	1,000	1,500	4.40	23	35
.....	.....	.....	Roadster	975	925	4.40	23	23
.....	.....	.....	Sedan	1,040	1,675	4.40	34	38
.....	.....	.....	Coupe	1,085	1,200	4.40	2'	28
Data obtained from the Buick Motor Car Co., May, 1923						Recommendations for Buick-Four Car		
23-34	.....	2	Roadster	1,395	1,390	5.25	24	18
23-35	.....	5	Touring	1,375	1,950	5.25	24	31
23-36	.....	3	Coupe	1,500	1,550	5.25	26	26
23-37	.....	5	Sedan	1,500	2,200	5.25	26	38
23-38	.....	5	Touring	1,500	2,100	5.25	26	37
Data obtained from a questionnaire filled out by the Jordan Motor Car Co., Inc., May, 1923						Recommendations for Jordan Car		
M X	120	5	Touring	1,630	2,335	6.20	21	32
M X	120	5	Brougham, Four-Door	1,700	2,560	6.20	23	35
M X	120	2	Road	1,600	1,760	6.20	21	24
H	124½	1	Sport	1,700	2,275	6.20	23	31
H	124½	5	Sedan	1,860	2,645	6.20	25	35
Data obtained from the Lincoln Motor Co., May, 1923						Recommendations for Lincoln Car		
117	136	7	Sedan	2,360	3,610	7.30	25	38
118	136	7	Limousine	2,360	3,610	7.30	25	38
120	136	7	Town Car, Open Drive Limousine	2,260	3,470	7.30	23	36
123	136	4	Phaeton	2,170	2,930	7.30	22	32
124	136	7	Touring	2,360	3,250	7.30	25	34
125	136	4	Sedan	2,250	3,130	7.30	23	33
126	136	4	Coupe	2,600	2,940	7.30	27	31
129	136	5	Sedan	2,270	3,210	7.30	24	34
130	136	2	Roadster	2,120	2,275	7.30	23	24

Vulcanization Accelerator

A process of making a vulcanization accelerator is patented in United States Patent No. 1,453,515, which is assigned to the R. T. Vanderbilt Co. The process consists in making an oxidation product of a metallic salt of an organic acid, Dimethylamine is condensed with carbon disulphide and precipitated with an aqueous solution of zinc sulphate to form an insoluble zinc salt. Then this salt is oxidized.

Unvulcanized Rubber Composition

An unvulcanized rubber composition consists of crude rubber, an inert filler of some kind, finely divided active gas black, (which is present in the proportion of not less than fifteen per cent of the total weight of the mixture) and a softening agent. This composition is patented in United States Patent No. 1,455,893, and is assigned to the Aluminum Seal Co.

MARKETS

Cottons and Fabrics

NEW YORK, July 18, 1923

The cotton market and the cotton trade were considerably upset by the Government cotton report estimating the acreage planted as 38,287,000, the greatest on record and putting the coming crop at a possible 11,412,000 bales, more than 600,000 bales above the average of private estimates. The decline in the price of raw cotton which followed the publication of the report was halted around the 23 cent level and then rallied quite vigorously. The condition of 69.9 did not excite much comment as it was in line with general trade expectations. The trade is somewhat skeptical of the estimated yield and recalls that last year the report in July was 11,065,000 bales but the yield was actually 9,761,817 bales. What this seasons crop will actually be is a matter of conjecture, for improvement in July does not necessarily insure a large crop as August is the most critical of all the growing months. At the present time reports from all sections of the cotton belt are very favorable both as to weather and weevil.

Cotton prices as of July 18 on the New York Cotton Exchange were as follows:

	Open.	High.	Low.	Close.	Previous Day.
July	26.53	26.70	26.40	26.60	26.62
Oct.	23.65	23.95	23.62	23.73@75	23.68
Dec.	23.12	23.44	23.10	23.22@25	23.15
Jan.	22.80	23.13	22.80	22.96@99	22.80
March	22.80	23.14	22.80	22.96@98	22.83
May		23.03	22.85	22.85	22.70

Consumption Lower in June

The report on cotton consumption in the United States during June and the number of spindles in operation during that month indicate a slowing up in the industry. There was a falling off in consumption of about 78,000 bales but the figures showed increased activity when compared with June of last year. There was consumed this year 542,166 bales of lint and 49,635 of linters, compared with 620,965 of lint and 54,728 of linters in May this year. In June last year 507,218 bales of lint and 57,817 of linters, were consumed.

The active spindles totaled 34,843,421 compared with 35,390,137 in May and 31,877,015 in June last year.

Cotton on Hand

The total amount of cotton on hand on June 30 was estimated to be 2,577,954 bales as compared with 3,284,381 on the same date last year. In consuming establishments there were 1,345,066 bales of lint and 145,285 of linters compared with 1,621,290 of lint and 159,604 of linters on May 31 this year and 1,330,903 of lint and 151,402 of linters at the close of June last year. In public storage and at compressors on June 30 this year there were 1,232,888 bales of lint and 42,014 of linters compared with 1,579,606 of lint and 47,583 of linters on the last day of May and 1,953,478 of lint and 76,398 of linters on June 30 last year.

Exports and Imports

Exports of cotton during June totaled 214,851 bales which included 1,902 bales of linters compared with 160,368 bales in May this year inclusive of 2,818 bales of linters. In June last year the exports amounted to 491,079 bales including 12,768 of linters. In connection with these figures it is interesting to recall that the largest monthly export of cotton since the war was 929,671 bales. This was in January 1920 and the following September we exported only 116,668 bales; the smallest amount for any month since the war. The smallest monthly export during the war period was in September 1914 when only 125,778 bales were sent abroad.

The imports during June totaled 13,367 bales against 23,593 in May and 12,662 in June last year.

The great bulk of the cotton was consumed in the cotton growing states where 350,967 bales were used compared with 191,199 bales in all other states.

EXTRA STAPLE COTTON

An improvement in the demand for domestic and Egyptian staples naturally followed the weeks of extreme dulness; but curtailment of production at the mills was not conducive to any considerable activity in the market. A quickening of business is looked for after August 1. Prices of extra staple cotton, strictly middling in grade and color, f.o.b. New Bedford, are as follows:

1 1/8 inch, 30½ to 31½ cents.
1 3/16 inch, 31½ to 32½ cents.
1 1/4 inch, 33 to 34½ cents.
1 5/16 inch, 35 cents upwards.

Egyptian uppers, medium, are quoted at 31 to 32½ cents; medium grade Saks, 33 to 34½ cents; high grade Saks, 35 cents upward; Peruvian mitafifi, 31 to 32 cents. Pimas were in quiet demand with ones at 37 cents; twos, 36 cents and threes, 35 cents.

TIRE FABRICS

It is not many weeks since it was predicted that fabric mills would have to close down on account of a shortage of cotton. Many mills have closed down and curtailment is the order of the day but it is a shortage of orders and not a shortage of cotton that brought about the curtailment. Tire fabric prices are low, below the cost of production some producers say, and here again lack of actual buying interest is the cause. The market is quiet with quotations nominally as follows:

CORD FABRICS			
Combed Sakellarides	.70	@	.75
Combed Peeler, lb.	.60	@	.65
Carded Peeler, lb.	.55	@	.60
Combed Egyptian uppers, lb.	.64	@	.67
Carded Egyptian uppers, lb.	.59	@	.62
SQUARE WOVEN			
17¼-ounce Egyptian uppers, combed, lb.	.62	@	.65
17¼-ounce Egyptian uppers, carded, lb.	.57	@	.60
17¼-ounce Sakellarides, combed, lb.	.68	@	.73
17¼-ounce Peeler, combed, lb.	.58	@	.63
17¼-ounce Peeler, carded, lb.	.53	@	.58

SHEETINGS—The market continued quiet with a feeling in the trade that if confidence is to be placed in the last Government crop condition prices are at a satisfactory level. The market on 40-inch, 2.85-yard was placed at 13½ cents net; for 40-inch, 2.50-yard, 16 cents and 10½ cents for 40-inch, 3.75-yard.

DUCKS—There was evidence of improvement in the cotton duck market although trading was quiet. Prevailing values are considered low. Enameling duck is quoted at 50 to 51 cents a pound, depending on width and make. Single filling is quoted at 21 to 23 cents, cord basis, price varying according to grade and hose duck at 42 to 43 cents a pound.

BURLAPS—Quotations are now very near to the lowest prices of the year. Lights sold as low as 5.20 cents and heavies touched 6.80 cents during the year.

SHEETINGS					
40-inch	2.50-yard	yd.	.16	@	—
40-inch	2.85-yard	yd.	.13½	@	.13¾
40-inch	3.15-yard	yd.	.14¾	@	—
40-inch	3.60-yard	yd.	.12½	@	—
40-inch	3.75-yard	yd.	.10½	@	—
40-inch	4.25-yard	yd.	.09½	@	—
DUCKS					
Belting		lb.	.42	@	.43
Hose		lb.	.42	@	.43
Enameling		lb.	.50	@	.51
Shoe Ducks		lb.	.45	@	.50
Single filling		lb.	.21	@	.23
Double filling		lb.	.23½	@	.25
BURLAPS (Carload Lots)					
7½-ounce	40-inch		5.25	@	5.30
8 -ounce	40-inch		5.30	@	5.35
10 -ounce	40-inch		7.05	@	7.10
10½-ounce	40-inch		7.10	@	7.15
DRILLS					
37-inch	3.25-yard	yd.	.12¾	@	—
37-inch	2.75-yard	yd.	.14½	@	—
37-inch	3.00-yard	yd.	.13¾	@	—
37-inch	3.50-yard	yd.	.12	@	—
37-inch	3.95-yard	yd.	.10½	@	—
OSNABURGS					
30-inch	7-ounce		.16½	@	.17
40-inch	7-ounce		.16¾	@	.17

Chemicals and Compounding Ingredients

THE INDUSTRIAL CHEMICAL MARKET—NEW YORK, July 17, 1923—The two weeks past were exceedingly quiet ones in the industrial chemical market. Trading was of a routine character and midsummer dulness prevailed in most departments. Price movements were within a narrow range, with a few declines, but most materials remained nominally unchanged. Important buying was confined to a few commodities and in most cases the passing business was such as was necessary to meet small, immediate requirements. Especial firmness was noted in lithopone and the alkalis. In its general aspect the present dulness is only that which is characteristic of each summer's market and in no way has there been any indication that the market is other than fundamentally sound.

ACCELERATORS

Organic			
Aldehyde ammonia, crystals	lb.	$ .90	@ .95
Aniline oil, drums	lb.	.16	@ .16½
Diphenylguanidine	lb.	1.20	@ —
Excellerex,	lb.	.45	@ .50
Formaldehyde-Aniline	lb.	.52½	@ —
Hexamethylene-tetramine	lb.	.95	@ 1.00
Paraphenylenediamine	lb.	1.55	@ 1.60
Thiocarbanilide, kegs	lb.	.27	@ .30
Vulcocene	lb.	.35	@ —
Inorganic			
Lead, sublimed blue	lb.	.09¼	@ —
Lead, white	lb.	.09¼	@ —
Litharge, domestic	lb.	10.40	@12.09
imported	lb.	.17	@ —
Lime, Superfine	lb.	.02	@ .02½
Magnesia, calcined, light,	lb.	.23	@ .24
extra light	lb.	.45	@ —
heavy	lb.	.05	@ .06
Orange Mineral	lb.	13.90	@14.00

COLORS

Blacks			
Carbon Black	lb.	.17	@ .20
Micronex		.16	@ .18
Lamp Black	lb.	.12	@ .40
Bone "	lb.	.05½	@ .07½
Drop "	lb.	.07½	@ .10
Ivory "	lb.	.15	@ .45
Blues			
Prussian	lb.	.55	@ .60
Ultramarine	lb.	.08	@ .35
Cobalt	lb.	.21	@ .26
Browns			
Iron oxide	lb.	.04	@ .05½
Sienna, Italian,	lb.	.06	@ .14¼
Umber, Turkey,	lb.	.03¾	@ .04⅝
Vandyke, domestic	lb.	.03½	@ .04
Greens			
Chrome, light	lb.	.32	@ .34
medium	lb.	.35	@ .36
dark	lb.	.36	@ .45
commercial	lb.	.12	@ —
Reds			
Antimony crimson, 15/17% F.S.	lb.	.36	@ .45
sulphur free	lb.	.39	@ .50
golden, 15/17% F.S.	lb.	.20	@ —
calcium and sulphur free	lb.	.40	@ —
red sulphuret 15/17% F.S.	lb.	.19½	@ —
Indian, English	lb.	.08	@ —
Commercial		.08	@ .12
Para toner	cwt.	1.00	@ 1.10
Toluidine toner	lb.	2.10	@ 2.25
Venetian red	lb.	.03½	@ .06
Vermillion, quicksilver, English	lb.	1.25	@ —
domestic	lb.	.25	@ .30
Whites			
Albalith	lb.	.07	@ .07½
Aluminum bronze	lb.	.55	@ .60
Azolith	lb.	.07	@ .07½
Lithopone, domestic (factory)	lb.	.07	@ .07½
Zinc Oxide—American Process			
American Horse Head special	lb.	.08½	@ .09
XX red	lb.	.08	@ .08½
American Azo: ZZZ (lead free)	lb.	.08	@ .08½
ZZ (under 5 per cent leaded)	lb.	.07¼	@ .07¾
Z (8-10 per cent leaded)	lb.	.07¼	@ .07¾
Zinc Oxide—French Process			
White seal	lb.	.12	@ .12¼
Green seal	lb.	.10¾	@ .11¼
Red seal	lb.	.09¾	@ .10¼
Yellows			
Chrome, light		.20	@ .21
dark and medium	lb.	.20	@ .21
Cadmium Sulphide	lb.	1.50	@ 1.75
Ocher, French	lb.	.02	@ .03
domestic	lb.	.01½	@ —

COMPOUNDING INGREDIENTS

Aluminum flake	ton	29.00	@ —
hydrate light	lb.	.19	@ .21
Ammonia carbonate,	lb.	.09	@ .10½
Barium carbonate,	ton	68.00	@75.00
Barium Dust	lb.	.05	@ —
Barytes southern off-color,	ton	15.00	@20.00
Western, prime white	ton	28.00	@ —
Basofor	lb.	.04¾	@ —
Blanc fixe, dry f.o.b.works	lb.	.04	@ .04½
Carrara filler	lb.	.01½	@ .02
Chalk, precipitated, extra light	lb.	.04½	@ .05
heavy	lb.	.03¼	@ .04
Clay, China, domestic,	ton	15.00	@16.50
Dixie	ton	22.00	@32.00
Blue Ridge	ton	20.00	@30.00
Fossil flour	ton	60.00	@ —
Glues, extra white	lb.	.30	@ .40
medium white	lb.	.20	@ .26
cabinet	lb.	.18	@ .30
cabinet low grade	lb.	.16	@ .19
common bone	lb.	.08½	@ .14
Graphite flake, bbls.	lb.	.06½	@ .12
amorphous	lb.	.05	@ —
Infusorial earth, powdered	ton	60.00	@ —
bolted	ton	65.00	@ —
Liquid latex	gal.	1.30	@ —
Mica, powdered	lb.	.15	@ —
Rotten Stone (powdered)	lb.	.02½	@ .04½
Soapstone, powdered	ton	12.00	@15.00
Starch, powdered	cwt.	3.20	@ 3.22
Talc, domestic	ton	15.00	@18.00
French	ton	20.00	@ —
French, high grade	ton	40.00	@ —
Italian	ton	47.00	@58.00
Terra Alba	cwt.	1.85	@ 2.00
Tripoli, white	lb.	.02	@ .02½
Whiting, commercial	cwt.	1.00	@ 1.25
English cliffstone	cwt.	1.50	@ 2.50
gilder's bolted	cwt.	1.10	@ 1.25
Paris white American	cwt.	1.25	@ 1.50
Quaker	ton	13.00	@15.00
Wood pulp XXX	ton	35.00	@ —
" " X	ton	25.00	@ —
Zinc Oxide— lead free	lb.	.08	@ —
5 per cent leaded		.07¼	@ .07¾
10 per cent lead sulphate	lb.	.07¼	@ .07¾
20 per cent lead sulphate	lb.	.07¼	@ .07¾
35 per cent lead sulphate	lb.	.07¼	@ .07¾

(Also see whites)

MINERAL RUBBER

Genasco (factory)	ton	50.00	@52.00
Hard hydrocarbon	ton	33.00	@42.00
Soft hydrocarbon	ton	30.00	@40.00
Pioneer M.R.	ton	42.00	@44.00
320/340 M. P. hydrocarbon (c. l. factory)	ton	45.00	@50.00
300/310 M. P. hydrocarbon (c.l. factory)	ton	40.00	@45.00
Synpro, granulated, M. R. (factory)	ton	55.00	@70.00

SOFTENERS

Acids			
Acetic, 28 per cent	cwt.	3.38	@ 3.63
Cresylic, 97 p.c.	gal.	1.15	@ 1.20
95 p.c.	lb.	1.10	@ 1.15
Muriatic, 20 degrees	cwt.	1.00	@ 1.10
Nitric, 36 degrees	cwt.	4.50	@ 5.00
Sulphuric, 60 degrees	ton	9.50	@12.00
66 degrees	ton	15.00	@16.00
Tartaric, crystals	lb.	.37¼	@ —
Alkalies			
Caustic soda, 76 p.c.	cwt.	3.26	@ 3.75
Soda ash, 58 p.c.	cwt.	1.95	@ 2.30
Oils			
Castor, No. 3, bbls.	lb.	.14	@ .15
Corn, crude, bbls.	lb.	.12⅛	@ .12¼
refined	lb.	.13	@ —
Chinawood, bbls.	lb.	.24½	@ .25
Cottonseed,		.09	@11.75
Glycerine, drums	lb.	.16	@ .16½
Linseed, domestic	gal.	1.03	@ 1.05
Palm Niger	lb.	.06¾	@ .07
Lagos	lb.	.07	@ .07¼
Peanut,domestic,crude	lb.	.15	@ —
Pine, steam distilled	gal.	.70	@ .75
Rapeseed, refined	gal.	.80	@ —
blown	gal.	1.00	@ 1.05
Rosin, first rectified	gal.	.46	@ —
second rectified	gal.	.48	@ —
Tar, commercial	gal.	.27	@ .28
Soya Bean		.12½	@ .12¾
Petroleum, standard	lb.	.06	@ .08
dark amber	lb.	.03½	@ —
Resins and Pitches			
Cumar resin, hard	lb.	.09	@ .10
soft	lb.	.09	@ .10
Tar Retort	bbl.	12.50	@ —
kiln burned	bbl.	13.50	@ —
Pitch, Burgundy	lb.	.05	@ .06
coal tar	lb.	.01½	@ .02
pine tar	lb.	.03	@ —
Rosin, grade K	bbl.	5.95	@ —
Shellac, fine orange	lb.	.90	@ —
Solvents			
Acetone, drums	lb.	.25	@ —
Alcohol, denatured, No. 1 bbls.	gal.	.45	@ .47
Benzol, tanks	gal.	.27	@ .32
Benzol, 90 per cent	gal.	.25	@ .30
pure	gal.	.30	@ .35
Carbon bisulphide,	lb.	.06	@ .06¾
Tetrachloride	lb.	.09	@ .10½
Dimethylaniline	lb.	.42	@ .43
Motor gasoline, steel bbls.	gal.	.21½	@ —
Naptha, V. M. & P.	gal.	.20½	@ —
Toluene		.35	@ .38
Toluol, pure	gal.	.30	@ .35
Turpentine, spirits	gal.	1.20	@ —
wood	gal.	1.00	@ —
Waxes			
Beeswax	lb.	.40	@ .42
Carnauba, No. 1	lb.	.42	@ .43
Ceresin, white	lb.	.10	@ .11
Bayberry	lb.	.28	@ .33
Montan, crude	lb.	.04½	@ .05
Ozokerite, black	lb.	.18	@ —
green	lb.	.27	@ .28
Paraffine	lb.	.02¾	@ .03
Sweet wax	lb.	.10	@ .12

SUBSTITUTES

Black	lb.	.09½	@ .14
White	lb.	.10	@ .16
Brown	lb.	.10	@ .15
Brown factice	lb.	.09	@ .15
White factice	lb.	.09½	@ .16

VULCANIZING INGREDIENTS

Black hyposulphite	lb.	.38	@ —
Sulphur chloride (jugs)	lb.	.05	@ .06
" " (drums)	lb.	.05	@ .06
Sulphur flour (bbls.)	cwt.	2.75	@ 3.30
(bags)	cwt.	2.50	@ 2.75
Commercial		1.35	@ 1.70
Superfine		2.00	@ 2.40
Sulphur, 100 per cent pure,		—	@ —
Bergenp't brand (bags)	cwt.	2.50	@ 2.80
(bbls.)	cwt.	2.75	@ 3.05

Chemicals

Lithopone—This material continues to grow in favor with the rubber makers and the demand from this industry in the first half of the year has been the greatest in any six months. The problem with the producer has been how to secure crude barytes from domestic sources of the proper quality for making lithopone now that the amount of material coming from abroad has been so greatly reduced. The market continues firm with heavy demand. Domestic is quoted at 7 cents a pound for bags; barrels, car lots 7 to 7¼ cents; less than car lots, 7¼ to 7½ cents.

Litharge—There was a cut of ½ cent a pound in this pigment. The price change did not affect the condition of the market which continues inactive. Casks now bring 10.40 cents a pound; 100 to 500 pound kegs, 14 cents a pound; 500 to 2,000 pounds, 12.60 cents; 2,000 to 10,000 pounds, 12.09 cents.

Orange Mineral—Domestic and English material was reduced ½ cent a pound the latter now being quoted at 15 cents a pound and the Domestic at 13.90 cents. French material continues at 17 cents. The market was quiet with only slight demand.

Barytes—The market has been all that producers could hope for. The rubber and other industries were heavy consumers during the first half of the year and the outlook for the rest of the year is very bright. There was no change in price, prime Western continuing at $28.-00 a ton f.o.b. works and Southern off color $15 to $20.

Zinc Oxide—The market has been quiet since the middle of June, on account of a slowing down of the tire trade, a condition that seems more pronounced in view of the feverish activity that has prevailed in the zinc oxide market since the first of the year. The outlook for the rest of the year to follow the present industrial breathing spell is very good. No changes in quotations were recorded.

Carbon Black—The tense situation that has prevailed in this market has eased up and greatly increased production assures a sufficient supply to meet the demand the coming months.

Carbon Bisulphide — There has been better than the seasonal demand for this material and a firm market prevails. The price quoted is 6 to 6¾ cents per pound.

Caustic Soda — The market continues very active and prices are well maintained. Quotations remain at $3.26 to $3.75 per hundred pounds for 76 per cent.

Soda Ash—The market for soda ash was very active and the demand thus far this month is much heavier than during June. Contract withdrawals continued in heavy volume. The quotation on 58 per cent continues at $1.95 to $2.30 per hundred pounds.

Aniline Oil—There was little demand and prices were easy. For tanks at works 16 cents was quoted.

Talc—All tales continue in steady demand. Domestic is quoted at $15 to $18 per ton; Italian $47 to $58; French, $20; high grade French, $40.

Whiting—The demand for whiting was good and prices held firm. Commercial is quoted at $1 per hundred pounds; American paris white, $1.15; English cliffstone $1.50.

Scrap Rubber

NEW YORK, JULY 17, 1923

The scrap rubber market has been quieter during the past two weeks than it has been for some time. There was but a limited amount of buying done, while quotations showed practically no change. Dealers, however, continue to assert that there will be an improvement in market conditions by the end of August.

One dealer, who does a large export business, states that if France and Germany could settle their differences quotations of scrap rubber would move upward. Until the war Germany was a large importer of scrap, using this class of rubber for toys and other cheap rubber articles. Dealers also state that reclaimers are now marking time.

Scrap dealers' warehouses are well stocked, and in their opinion it is only a matter of time before manufacturers will again be in the market. Prices quoted at this date are:

Auto tire peelings	.01	@	.01¼
Standard White auto ....ton	20.00	@	25.00
Mixed auto .....ton	12.00	@	14.00
Bicycle tires .....ton	7.00	@	8.00
Clean solid truck tires	.01¼	@	.01½
Boots and shoes	.03	@	.03¼
Arctics, trimmed	.02	@	.02¼
Arctics, untrimmed	.01⅛	@	.01⅝
Inner tubes, No. 1	.04½	@	.04¾
Inner tubes, compounded	.03¼	@	.03½
Inner tubes, red	.03½	@	.04
Battery jars, clean hard rubber	.02	@	.02½
Rubber Hose	.00¾	@	.00⅞
Red packing	.01	@	.01¼
White druggist sundries	.04	@	—

Reclaimed Rubber

NEW YORK, JULY 17, 1923

The reclaim rubber market has been quiet and inactive during the past two weeks. Dealers state that manufacturers are awaiting developments before placing commitments. Prices of reclaimed rubber should commence to move upward by the latter part of August. During the past two weeks there has been little or no buying.

Boots and shoes (unwashed) moved up fractionally, quoted .12½ @ .13¼, while floating tube remained steady throughout, quoted, .15 @ .15½, while friction advanced ½ cent.

Quotations of this date are as follows:

Standard Reclaims			
Floating Tube	.15	@	.15½
Friction	.21½	@	.22¼
Boots and Shoes (unwashed)	.10½	@	.11
Boots and Shoes (washed)	.12½	@	.13¼
Mechanical	.10	@	.11
Hose	.10	@	.11
Tires, truck	.08½	@	.09
Tires, auto, black	.09	@	.09½
Black (washed)	.11	@	.11½
White	.13	@	.13½
Grey	.11	@	.11½

Crude Rubber

NEW YORK, JULY 17, 1923

There was but little activity in the crude rubber market during the past two weeks. There were but few inquiries from manufacturers, since a number of companies have closed down for inventories. There were also some inquiries from speculative buyers, but the prices they were willing to pay were too low, although in some instances their offers were within ⅛ cent of the prices demanded by dealers.

During the past two weeks crude prices have recovered somewhat from the low level reached in June. Ribbed smoked sheets are quoted 25¼ @ 25½, while August, September, October and November deliveries are quoted 26½ @ 27.

A cable to the New York News Bureau states that the standard export percentage of crude rubber under the Stevenson plan is expected to be reduced to 60 per cent next month from the present rate of 65 per cent because average prices have not been maintained at the necessary level during the past quarter. London cables state that there has been a steady reduction in stocks of rubber there, this being attributed to the overpurchasing by American manufacturers in the fore-part of this year. For the first five months of the current year imports totaled 157,-105 tons, against 114,608 tons in the corresponding period last year.

Crude rubber dealers state that there will be but little activity in the crude rubber market until the retail tire dealers have worked off their surplus stocks. Possibly by the middle of September there will be a substantial upswing in the prices of crude rubber.

There was some buying of Paras and the lower grades of plantations, but in many instances prices were slghtly in the buyers favor.

Quotations of this date are as follows:

Ribbed Smoked Sheets	.25¼	@	.25½
First Latex, spot	.25¼	@	.25½
August-December	.26½	@	.27
Amber Crepe No. 1, spot	.24½	@	.24¾
Amber Crepe No. 2, spot	.24½	@	.24¾
Amber Crepe No. 3, spot	.23¾	@	.24
Light Clean Thin Brown Crepe	.24½	@	.24¾
Commercially Clean Thin Brown Crepe	.24	@	.24¼
Specky Brown Crepe	.23½	@	.23¾
Roll Brown Crepe, spot	.23¾	@	.24
Paras			
Madeira Fine	.27¼	@	.27½
Acre Fine	.26½	@	.26¾
Up-river Fine	.26½	@	.26¾
Up-river Medium	.25½	@	.25¾
Up-river Caucho Ball (shipment)	.24½	@	.24¾
Up-river Coarse	.23	@	.23¼
Islands Fine	.26	@	.26¼
Islands Medium	.24	@	.24¼
Islands Coarse	.13	@	.13½
Cameta	.13	@	.13½
Xingu Ball	.23	@	.23¼
Tapajos Fine	.26½	@	—
Tapajos Medium	.22¾	@	.23
Pontianac			
Prime Pressed	.13	@	.14
Plantation	.07½	@	—
Bangermassin	.08	@	—
Siak Gutta Percha	.20¾	@	—
Prime Macassar	3.00	@	—
Balata			
Surinam Sheets	.80	@	.85
Columbia Block	.60	@	.65
Venezuela Block	.70	@	.75

NEW INCORPORATIONS

CALIFORNIA

Walton Airless Tire Co., to deal in tires. $1,000,000. Principal office, Los Angeles, Calif. Incorporators: E. E. Nichols, J. S. Walton, G. O. Walton, J. A. Judkins, W. A. Kampmann and G. B. Stevens.

California Golf Ball Co., to manufacure golf balls. $200,000. Principal office, Los Angeles, Calif. Incorporators: E. C. Huyck, G. A. King and P. J. Higgins.

Ever-Wear Tube and Rubber Corporation. $500,000. Principal office, Los Angles, Calif.

CONNECTICUT

Sanford Rubber Works, Inc., to manufacture molded rubber goods, heels, soles, etc. $50,000. Principal office, Salisbury, Connecticut. Incorporators: S. A. Doughty, S. M. Sanford and J. R. Sanford.

DELAWARE

Carlsten Tire & Rubber Co., to manufacture and deal in rubber and rubber goods. $550,000. Delaware agent, United States Corporation Co., Dover, Delaware.

Wood Krenson Rubber Co. $25,000. Incorporators: John W. Krenson, Philadelphia; Philip H. Wood, Jr., Salem, N. J.; Harry H. Emmons, Wilmington, Delaware; Philip H. Wood, Jr., Wilmington, Delaware.

MASSACHUSETTS

J. W. Reardon & Son., Inc., to deal in rubber goods. $25,000. Incorporators: Joseph W. Reardon, Arlington, Mass.; Alfred A. Reardon, Dorchester, Mass.; Isabella E. Reardon, Dorchester, Mass.

NEW YORK

United Baltic Corporation, to manufacture rubber products. Address of incorporators, 55 Wall St., New York City. Incorporators: F. N. Bangs, F. W. Jackson and J. F. Dempsey.

Eastern Motor Supply Co., to manufacture and deal in tires. $10,000. E. Waldman, Brooklyn, N. Y. and I. R. Levy, 249 West 112th street, New York City.

Rochester Tire Corporation, to deal in automobile tires. $5,000. Principal office, Rochester, New York. Incorporators: M. J. Mungovan, F. A. Miller and A. F. Aman.

Hudson Tire & Rubber Corporation. $1,000,000 to $1,500,000. Principal office, Yonkers, New York.

Achilles Rubber Corporation, to manufacture tires, etc. 5000 shares common stock, no par value; active capital $150,000. Principal office, Binghamton, New York. Incorporators: D. T. Rice, W. M. Broderick and R. J. Brown. Attorney, L. S. Clark, Binghamton, New York.

OHIO

Republic Rubber Co., to manufacture rubber goods. Principal office, Youngstown, Ohio. Incorporators: T. L. Jackson, C. F. Smith, D. J. Lyman, J. P. Huxley and J. T. Harrington.

Amalgamated Rubber Co., to manufacture rubber goods. $10,000. Principal office, Akron, Ohio. Incorporators: M. H. Skelton, A. L. Abt, E. C. Abt and B. Van Horne.

Reliance Tire Co., to deal in automobile tires. $25,000. Principal office, 1026 Gest street, Cincinnati, Ohio. Incorporators: A. Sander, H. A. Lange and C. M. Britz.

TEXAS

Ajax Rubber Company, Inc., New York. $5,000. Principal office, Dallas, Texas. State agent, F. C. Burnett, Dallas, Texas.

WASHINGTON

Pacific Rubber Co. to manufacture rubber products. $500,000. Principal office, Seattle, Washington. Incorporators: F. F. Moore, J. W. Collins and M. Katon.

WISCONSIN

Wisconsin-McWade Rubber Co. $10,000. Principal office, Milwaukee, Wisconsin. Inporators: A. C. Siegel, president; M. M. Rieck, vice president; A. A. Rieck, secretary and treasurer, 688 Downer Ave., Milwaukee, Wisconsin.

NAME CHANGE

Pennsylvania Rubber Co., of America, to Pennsylvania Rubber Co., of America, Inc.

TRADE MARKS

JULY 3, 1923

An elleptical shaped label with words for use on Airships, Sphericals, Kites, Number, Type, Aeronautical Accessories—No. 164,498. The Goodyear Tire and Rubber Co., Akron, O. For airships, spherical balloons, kites, aviation and aeronautical accessories.

LONGWEAR—No. 171,029. Niagara Shoe Co., Buffalo, N. Y. For shoes of leather, rubber and fabric.

MARION LEWIS CRAWFORD (facsimile signature)—No. 173,813. Marion Lewis Crawford, Malvern, O. For screen scratcher and rubber for use in making brick and tiles or other clay products.

RUNBO—No. 178,060. The Paine & Williams Co., Cleveland, O. For rubber matting.

PROTECTION—No. 179,030. Protection Tire and Rubber Co., Philadelphia, Pa. For rubber tires and inner tubes.

MILLER'S Eternal—No. 179,377. Miller's Book Store, Atlanta, Ga. For fountain pens.

RUBBER PATENTS

GRANTED JULY 3, 1923

1,460,533 Compression Inner Tube For Tires. George R. Colby, Portland, Oreg.

1,460,588 Tire. Edward A. Johnson, Brooklyn, N. Y.

1,460,599 Reenforced Pneumatic-Tire Casing. Herbert Nicholson, Chicago, Ill.

1,460,659 Boot And Liner For Automobile And Similar Casings. James L. D. Blevans, Dallas, Tex.

1,460,753 Pneumatic-Tire Wheel. Patrick J. Griffin, Dorchester, Mass.

1,460,775 Tire Structure. William A. Walsh, Avoca, Pa.

1,460,781 Pneumatic-Tire Protector. Charles W. Bain, Indianapolis, Ind.

1,460,794 Tube Casing. John H. Grube, Los Angeles, Calif., assignor to Grube Auto & Tire Specialties Corp'n., Phoenix, Ariz., a Corporation of Arizona.

1,460,804 Valve Stem For Pneumatic Tires. A. B. Shaw, Medford, Mass., assignor to Shaw Specialty Co. Inc., Boston, Mass., a Corporation of Massachusetts.

1,460,927 Vacuum Cup. Ralph S. Thompson and Carl F. Doscher, New York, N. Y.

1,460,933 Apparatus For Molding Plastic Substances. Richard Hartley Smith Abbott and James Brooks Close, London, England.

1,460,938 Method Of Mixing Or Masticating Heavy Plastic Material. David R. Bowen and Carl F. Schnuck, Ansonia, Conn. assignors to Farrel Foundry and Machine Company, Ansonia, Conn., a Corporation of Connecticut.

1,461,000 Method Of Making Inner Tubes. Ernest L. Fuller, Akron, Ohio, assignor to The Goodyear Tire & Rubber Company, Akron, Ohio, a Corporation of Ohio.

Features Rubber Sponge

The Consolidated Rubber Company, McKeesport, Pa., is now turning out toy balloons and rubber sponges. This organization is now endeavoring to turn out a sponge from which the dirt may be washed and the sponge used over and over for cleaning various articles, such as grease from automobiles and other machines. The Company expects to increase its working force shortly. The company is also making rubber gloves.

Crude Rubber Imports

Importations of Crude Rubber Into the United States During June, 1923

Figures compiled and distributed by The Rubber Association of America, Inc.

(Estimated net weights—long tons)

PLANTATIONS

FROM	TONS
Batavia	1,093
Belawan-Deli	2,758
Colombo	2,105
Hamburg	10
Japan and Others	120
Liverpool	445
London	3,535
Malacca	946
Penang	2,604
Pt. Swettenham	1,418
Rotterdam	323
Singapore	13,428
Sourabaya	1,889
	31,574

AFRICANS

FROM	TONS
Antwerp	31
Bordeaux	52
Hamburg	96
Havre	58
Liverpool	49
	286

CENTRALS AND GUAYULE

	TONS
Centrals (Mexico and Central America)	42
Guayule (Mexico)	—
	42

PARAS

	TONS
Bahia	5
Manoas	585
Montevideo	12
Para	430
	1,032

GUMS, WASTE RUBBER, ETC., IMPORTED FROM VARIOUS SOURCES

	TONS		TONS
Waste	300	Miscellaneous Gums	771
Balata	28		

Comparison 1922-1923

	JUNE-1922	JUNE-1923	Total Importations 6 months ending, JUNE 30th. 1922	1923
Plantations	14,851	31,574	124,001	178,947
Paras	861	1,032	5,109	7,888
Africans	14	286	810	2,617
Central	3	42	38	269
Guayule	—	—	281	309
Manicoba and Matto Grosso	21	—	119	9½
	15,750	32,934	130.358	190,039½

ARRIVALS PLANTATIONS FOR JUNE, 1923

FROM	ARRIVED AT	TONS
Batavia	Boston	32
Batavia	New York	1,939
Batavia	San Francisco	22
Belawan-Deli	New York	2,758
Colombo	Boston	105
Colombo	New York	2,000
Hamburg	New York	10
Japan and Others	San Francisco	48
Japan and Others	Seattle	41
Japan and Others	Vancouver	31
Liverpool	New York	445
London	Boston	49
London	New York	3,486
Malacca	New York	946
Penang	Boston	102
Penang	New York	2,452
Penang	San Francisco	50
Port Swettenham	Boston	129
Port Swettenham	New York	1,289
Rotterdam	Boston	51
Rotterdam	New York	272
Singapore	Boston	578
Singapore	Los Angeles	1,336
Singapore	New York	11,185
Singapore	San Francisco	329
Sourabaya	New York	1,889
		31,574

ARRIVALS OF PLANTATIONS BY PORTS

Atlantic Ports		
New York	28,671	
Boston	1,046	
		29,717
Pacific Ports		
Seattle	41	
San Francisco	449	
Los Angeles	1,336	
Vancouver	31	
		1,857
		31,574